THE NATIONAL GEOGRAPHIC MAGAZINE

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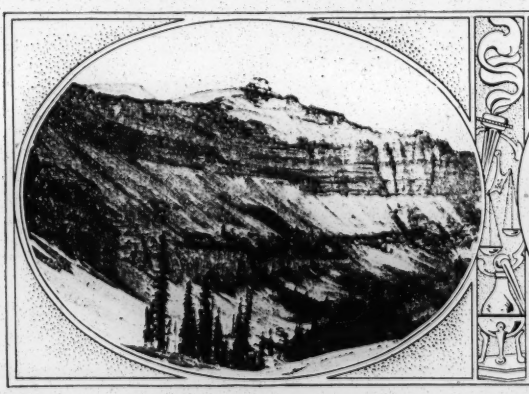

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VOL. XIV, No. 3 WASHINGTON MARCH, 1903

THE NATIONAL GEOGRAPHIC MAGAZINE

THE CANADIAN BOUNDARY

A REVIEW OF THE METHODS BY WHICH THE LINE HAS BEEN ADJUSTED AND MARKED

BY HON. JOHN W. FOSTER, EX-SECRETARY OF STATE

IN view of the interest which has been awakened in the boundary question by the Hay-Herbert treaty, recently ratified, for the settlement of the line between Alaska and Canada, I have been asked by the editors to furnish for the NATIONAL GEOGRAPHIC MAGAZINE a review of the history of the delimitation of the boundary line between the United States and Canada since the independence of our country.

The treaty of peace of 1783, between the United States and Great Britain, sought to fix with accuracy the boundaries of their respective possessions. These boundaries are laid down in detail in Article II of the treaty, the opening words of which are as follows: "And that all disputes which might arise in future, on the subject of the boundaries of the said United States may be prevented, it is hereby agreed and declared, that the following are, and shall be their boundaries," etc.

Notwithstanding the good intentions of the negotiators, the provisions as to the boundary proved to be a source of disagreement, and sometimes of violent dispute, for nearly a century. The disagreements arose mainly from a want of correct geographic knowledge on the part of the negotiators. For example, the initial point on the east was fixed at the mouth of St Croix River in the Bay of Fundy. But when it was sought to establish the boundary line, it was found that there was no river in that locality popularly known as the St Croix, but that there were two considerable rivers emptying into the Bay of Fundy, both of which had other names than that mentioned in the treaty. The United States claimed that the most eastern of these was the river designated in the treaty as the St Croix, and Great Britain claimed the western river as the treaty boundary.

Throughout almost the entire length of line of contact with Canada laid down in the treaty, geographic difficulties of interpretation have arisen, and the inaccuracy of knowledge of the negotiators is especially conspicuous in their

provision as to the (then) western termination of the line. It was traced through the Lake of the Woods to the most northwestern point of that lake, "and from thence on a *due west* course to the River Mississippi." They and the cartographers of that day supposed that the source of the Mississippi was in Canadian territory, northwest of the Lake of the Woods, whereas, it was a considerable distance south of that lake.

It was thought at the time that if the disputed question as to the St Croix River and the eastern boundary should be adjusted, the remainder of the line described in the treaty could be amicably demarked. It was accordingly agreed in the treaty of 1794, negotiated by Mr Jay, that this question should be submitted to arbitration by a commission composed of one American, one Englishman, and one umpire selected by the two. The commission rendered a unanimous award, describing with precision which was the river intended by the treaty to be the eastern boundary, and the award was accepted by both nations.

This arbitration, however, was far from settling the boundary questions. Four distinct controversies arose over different parts of the divisory line. The first was as to the ownership of the islands in and near Passamaquoddy Bay, a part of the Bay of Fundy. The second was as to the line from the source of the St Croix River along the Maine-New York frontier; the third as to the ownership of the islands in the St Lawrence River and the Great Lakes; and the fourth as to the line from Lake Superior to the northwestern corner of the Lake of the Woods.

Various efforts were made after the date of the award as to the St Croix River, in 1798, to adjust these questions by diplomatic negotiations, especially the first two, and a treaty to that end was signed but never ratified. In the negotiations which resulted in the treaty of peace of 1814 these subjects were considered and provision was made for their definitive settlement. This treaty was signed on the part of the United States by John Quincy Adams, Henry Clay, James A. Bayard, Jonathan Russell, and Albert Gallatin. It provided that the ownership of the islands in Passamaquoddy Bay should be passed upon by a commission composed of one American and one Englishman, and if they failed to agree they should report to their respective governments the points of disagreement and the grounds thereof, and the governments were to refer the points of disagreement to the arbitration of some friendly power. The commissioners were able to agree upon all the questions submitted to them, and there was consequently no arbitration.

The second question whose adjustment was provided for in the treaty of 1814—the line from the source of the St Croix River along the Maine-New York frontier to the St Lawrence—was likewise submitted to two commissioners, under the same terms as to arbitration in case of disagreement as just stated respecting the islands in Passamaquoddy Bay. This proved to be the most irritating, difficult, and tedious of all the subjects of dispute between the United States and Great Britain. The two commissioners first met at Portland, Maine, in 1816, and held various other sessions at different points in Canada and the United States adjacent to the region in dispute. They also caused elaborate surveys to be made and charted. After five years of vain efforts to reach an agreement, they adjourned in 1821, submitting to their respective governments their divergent views.

This threw the subject back into diplomacy for the naming of the arbitrator and fixing the terms of arbitration. Six years elapsed before these were consummated, and meanwhile the situation was further aggravated by the acts of conflicting authorities in the disputed territory. Finally, in 1827, it was agreed

that the matter should be referred to the arbitrament of the King of the Netherlands. In 1830 the King rendered his award, not accepting the line contended for by either party, but recommending a compromise boundary or a line of convenience. The American minister at The Hague, without instructions from Washington, protested against the award on the ground that it was a departure from the powers delegated to the arbitrator. The British Government manifested a disposition to acquiesce in the award, but intimated that its acceptance would not preclude the two governments from modifying the line. President Jackson was at first inclined to accept it, and it is said that he afterwards expressed regret that he had not done so; but he finally submitted the question of acceptance to the Senate, and that body advised him that it was not obligatory, and that new negotiations should be opened.

The British Government consented to this latter alternative, with the understanding that meanwhile the boundaries actually possessed should be observed by the authorities. The negotiations dragged along through several years, and new surveys were ordered; but it was not possible for the people on the border to observe the temporary boundary understanding. Strife occurred, a state of border warfare was created, Congress authorized the President to call out the militia, and voted $10,000,000 for public defense.

An open conflict between the two nations seemed imminent; the Commander-in-Chief of the Army, General Scott, was dispatched to the frontier, and through his interposition a temporary border truce was arranged.

In 1841 Mr Webster became Secretary of State. He was well acquainted with the controversy and possessed the confidence of those most interested—the people of New England. Lord Ashburton was sent to Washington by the British Government as a special plenipotentiary to adjust this long-pending and vexatious question. The result of their negotiations was the treaty of 1842, by which the line in controversy was definitely agreed upon and fixed. It was, however, a no more advantageous settlement for the United States than would have been secured by the award of the King of the Netherlands, and the prolongation of the dispute kept the border in a state of turmoil for more than ten years, brought the two countries to the verge of war, and caused a heavy outlay from the national treasury. In addition to the military and diplomatic expenditures, Congress voted to the States of Maine and Massachusetts the sum of $300,000 as compensation for the territory claimed by them, but conceded to Canada.

The third question respecting the Canadian boundary, for which provision was made for settlement by the treaty of 1814, was that relating to the line extending through the St Lawrence River and the Great Lakes, and the ownership of many islands along the route. The commissioners were to be appointed, with provision for arbitration in case of disagreement. They held their first meeting in 1816, and they spent a period of six years in causing surveys to be made, in visiting in person the entire line, and in conferences at different cities in the United States and Canada, and in the end were enabled to reach a harmonious decision in 1822. By this decision various islands which had been claimed and occupied by Canadians were transferred to the American side of the line, and others claimed by Americans were placed on the Canadian side.

The fourth question which was sought to be adjusted by the treaty of 1814 was the boundary line from Lake Superior to the northwestern point of the Lake of the Woods. This was entrusted to the same commission which had success-

fully fixed the boundaries of the St Lawrence and the Great Lakes. After they had concluded their labors under Article VI of the treaty of 1814, they began the work of delimitation of the frontier to the extreme of the Lake of the Woods. Their first session in discharge of this duty was held in 1822, and the work of survey and conference extended until 1827, when they adjourned *sine die*, with a disagreement upon the entire line from St Marys River, between Lakes Huron and Superior, to the western limit of the Lake of the Woods, and after an expenditure of more than $200,000. Under the treaty this disagreement should have been followed by a reference to a friendly sovereign as arbitrator; but the experience in the arbitration of the northeastern boundary did not encourage such a course, and the agitation over that subject overshadowed the less important question at that day of the extreme northwestern frontier. It was allowed to remain in a state of quiescence until the Webster-Ashburton negotiations, in 1842. After fifty years of diplomatic and arbitral controversy, the two governments had reached a state of political complaisance, and the large tracts of territory which had been the subject of disagreement on the northwest border were, in a spirit of mutual concession, divided by the treaty of 1842, and the line was marked out upon the maps made by the surveys of the commission. But even this settlement has not proven entirely complete, as some portion of the water boundary in the lakes is yet in doubt, and it is charged by Canada that the United States Land Office has surveyed, platted, and sold to Americans a considerable extent of land on the Minnesota-Wisconsin frontier which really belongs to Canada. The Government of the Dominion has sought on its own account to survey and mark the boundary in that region without the coöperation of the American authorities, but our Government has not accepted this survey.

The uncertainty as to the true boundary west of the Lake of the Woods, as described in the treaty of 1783, was removed by the treaty of 1818, Article II of which provided that from the lake the line should be drawn westward along the 49th parallel of latitude to the "Stony" or Rocky Mountains.

The line from the Rocky Mountains to the Pacific Ocean remained for forty years a subject of controversy. It engaged the attention of successive administrations up to the presidency of Mr Polk, various treaty and arbitral propositions being advanced only to be rejected by one or the other of the two nations. Our claim to the whole territory on the Pacific coast, from California to the Russian possessions at 54° 40′, was asserted by the Democratic National Convention of 1844, and entered largely into the campaign which resulted in Mr Polk's election. In his first message to Congress he declared our title to this region to be "clear and unquestionable," and he recommended to Congress to extend our laws and jurisdiction over it. John Quincy Adams, who was recognized as the highest living American authority on international questions, held with President Polk that our title to the territory up to 54° 40′ was complete and perfect.

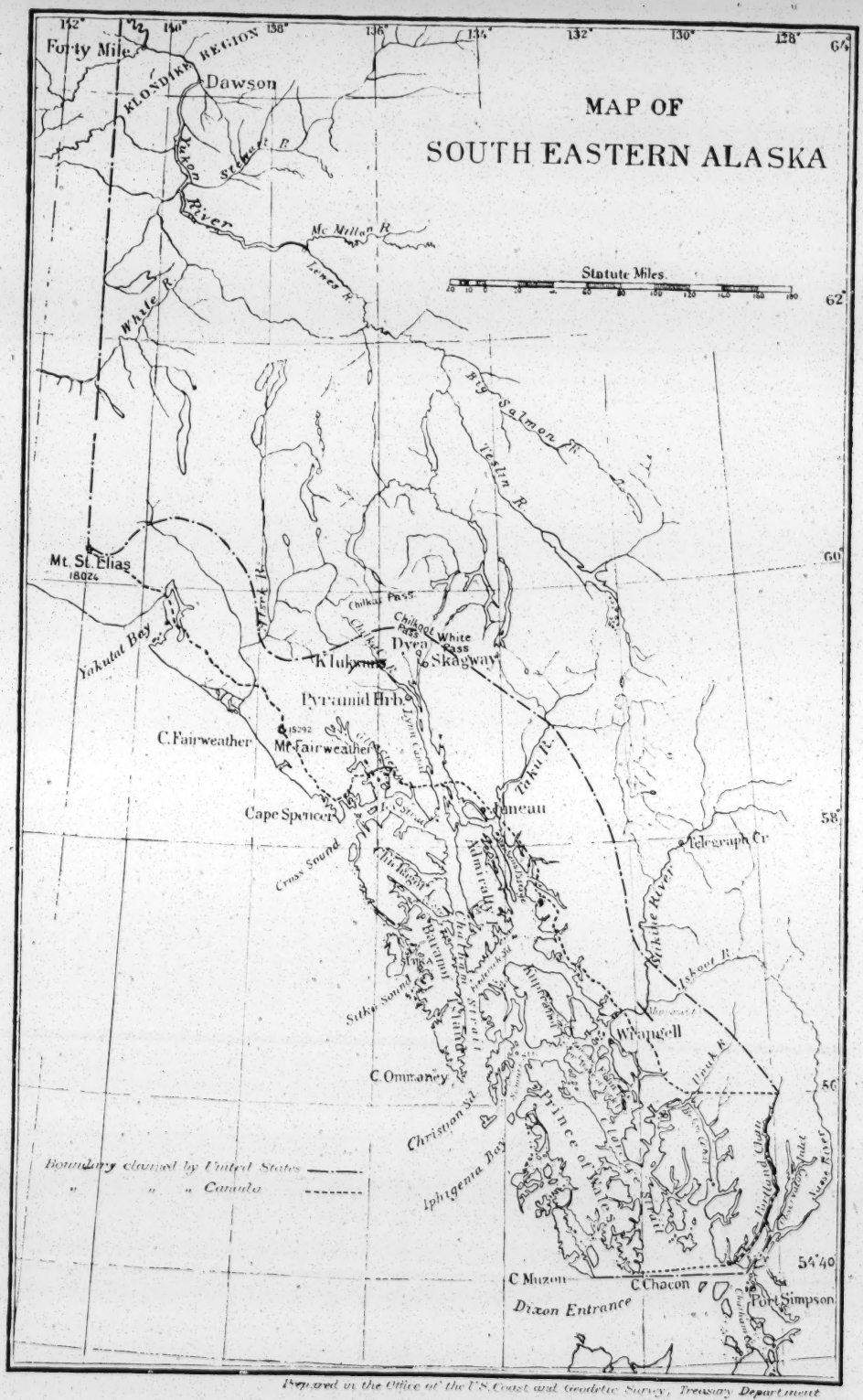
Congress, acting upon the President's suggestion, passed a joint resolution authorizing the President to give notice to Great Britain of the termination of the joint occupation. This brought about an energetic protest from Great Britain, and the country was awakened to the danger of hostilities; but the two nations found a better way of reconciling their differences, and after anxious deliberations Mr Buchanan, the Secretary of State, and the British Minister signed a convention in 1846 whereby the line of the 49th parallel was extended from the Rocky Mountains to the waters of the Pacific Ocean. By this act the vast domain now embraced in British Columbia was yielded to Great Britain,

although our title to it had been declared unquestionable by a national convention, by the President in his annual message, by Congress through joint resolution, and by some of the highest authorities on international law.

Still one more step was necessary before our chain of title to a fixed and unquestioned line from the Atlantic to the Pacific Ocean should be complete. In describing the Oregon boundary, Article I of the treaty of 1846 provided that the line should be "along the 49th parallel of north latitude to the middle of the channel which separates the continent from Vancouver's Island; and thence southerly through the middle of the said channel, and of Fuca's Straits, to the Pacific Ocean." The treaty had hardly been proclaimed before this water boundary began to be a matter of dispute. Between the Gulf of Georgia on the east and the Straits of Fuca on the west lie a number of islands, and it was not clear what was "the middle of the channel" among these islands. In this state of uncertainty the islands were being populated by both Americans and Canadians and conflicts of authority arose. Efforts were made to reach an agreement as to the channel by diplomatic negotiations, but they failed. In 1856 Congress passed an act authorizing a commissioner on the part of the United States to act with one to be appointed by Great Britain. These commissioners met, and after visiting in person the region in question were unable to reach an agreement. The subject went back into diplomacy, and for more than ten years it was a frequent topic of discussion, but no method of settlement could be attained.

In 1859 the settlers on San Juan Island came into conflict, the troops of the two countries became involved, and a collision seemed imminent. A second time the services of General Scott were invoked, and he arranged for a joint and peaceful occupation by troops of the two nations, but with difficulty were they able to prevent conflicts of the civil authorities. Finally, when the Joint High Commission met in Washington in 1871, the question of the true channel was submitted to the arbitration of the Emperor of Germany, and he rendered an award in favor of the contention of the United States.

The foregoing review shows that ever since the independence of the United States the boundary with Canada has been a subject of almost constant consideration between the United States and Great Britain, and that every step of the frontier line from the initial point on the Atlantic coast to the last water channel on the Pacific has been a matter of controversy, and sometimes of such bitter contention as even to threaten war. It also shows that three courses of action have from time to time been taken by the Government of the United States, to wit, treaty adjustment, joint and equal commissions, and arbitration. In the case of the important question of the northeastern boundary, resort was had successively to all three of these methods. It is seen that where adjustment by treaty has failed, a resort has been had to either joint commissions or to a foreign and neutral arbitrator. Treaty adjustment has not always been found the most acceptable method in popular estimation, as instance the Oregon boundary treaty. We have suffered less, in loss of territory claimed, by the action of joint commissions and by arbitration than by treaty settlement. Our public men and the Government have not found a strong title to territory a bar to the submission of boundary questions to the adjudication of a commission or an arbitrator.



Prepared in the Office of the U.S. Coast and Geodetic Survey, Treasury Department

Map Showing Different Alaskan Boundary Lines Claimed by United States and Canada

MOUNTAINS ON UNIMAK ISLAND, ALASKA*

By Ferdinand Westdahl

Assistant, U. S. Coast and Geodetic Survey

SHISHALDIN volcano is the highest mountain on the island,† and it vies with Mt St Helens, in Washington, in being in outline the most regular cone I know of on the Pacific coast of the United States. It is an active volcano, and the discharges from its crater come in puffs like steam at first and rising probably 100 feet or more above its summit, then turn darker in color and stream off horizontally with the direction of the wind. In calm weather the continuous discharges are seen to rise in a column more than 1,000 feet above it and gradually spread out in a dark cloud. When the wind blows hard over the summit the smoke is beaten down and follows the slope on the lee side of the peak. The snowy mantle of the mountain becomes dark after several days of calm weather, then clouds envelop it, snow falls and the mountain again emerges, clad in pure white. ‡ The snow line reached on September 21, 1901, down to an estimated height of 2,800 feet above the sea. At about 3,000 feet below the summit the regular cone begins to spread out, and at 4,000 feet there is a projecting spur to the westward. Glacier-carved canyons begin at about 4,000 feet or more below the summit, and from them

* This article consists of extracts from a report made in February, 1902, by Assistant Westdahl, commanding the Coast Survey Steamer *McArthur*, while engaged in a survey of that region. The extracts refer to certain interesting geographical features of Unimak Island, Alaska, and are published here, together with the accompanying photographs, by permission of the Superintendent of the Coast Survey. Unimak is one of the Aleutian Islands, about which very little is known, and therefore the description of the mountains as seen by the writer and recorded by the camera is especially interesting. Excerpts are also given from Mr Westdahl's description of the south shore of the island.

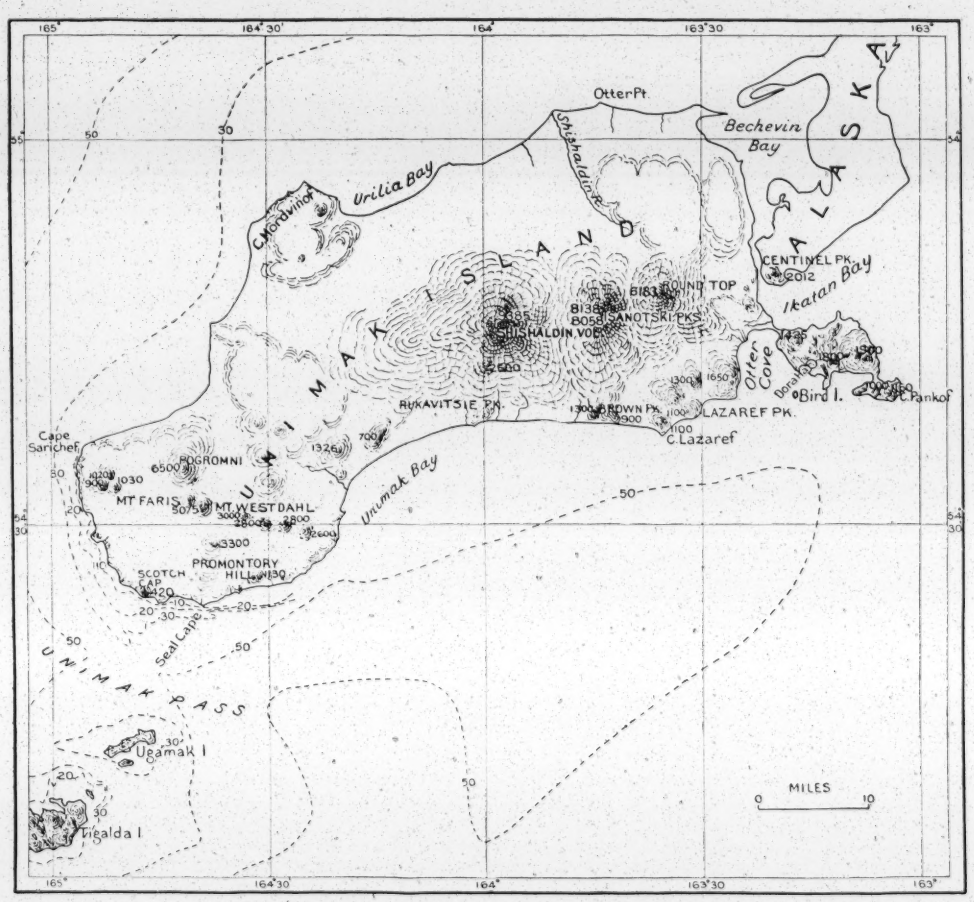
† "The island is uninhabited, and has been in that condition for the greater part of the present century, though it is richer than many other islands of the Aleutian chain in natural means of sustaining life.

"Foxes are quite plentiful here and sea otters frequent the reefs and points, but ever since—nearly 100 years ago—almost all the inhabitants of four or five populous villages were massacred by the Russian promyshleneks, a superstitious dread seems to prevent the Aleutian from making a permanent home at Oonimak (Unimak)." Ivan Petroff, p. 77, in "Narratives of Military Explorations in Alaska," compiled under the direction of "The Committee on Military Affairs" of the Senate. Government Printing Office, Washington, 1900.

‡ Miners bound for Cape Nome and whalers or sealers on their way to Bering Sea as they sail through Unimak Pass can see Shishaldin in the distance. When the air is clear the mountain presents a majestic spectacle, which is described by John Burroughs in the following words:

"Before nightfall we passed two more notable volcanic peaks, Isanotski and Shishaldin, both of which penetrate the clouds at an altitude of nearly 9,000 feet. These are on Unimak Island at the end of the peninsula. Our first glimpse was of a black cone ending in a point far above a heavy mass of cloud. It seemed buoyed up there by the clouds. There was nothing visible beneath it to indicate the presence of a mountain. Then the clouds blotted it out; but presently the veil was brushed aside again, and before long we saw both mountains from base to summit and noted the vast concave lines of Shishaldin that swept down to the sea, and that mark the typical volcanic form.

"The long, graceful curves, so attractive to the eye, repeat on this far-off island the profile of Fuji-Yama, the sacred peak of Japan. Those of our party who had seen Shishaldin in previous years described it as snow white from base to summit. But when we saw it the upper part, for several thousand feet, was dark—doubtless the result of heat, for it is smoking this year" (1899). From "Alaska," vol. 1, p. 90. "Alaska," the report of the Harriman Alaska Expedition. Edited by Dr C. Hart Merriam. New York: Doubleday, Page & Co., 1901.

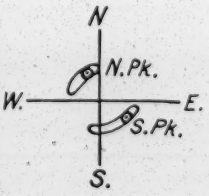


Outline Map of Unimak Island

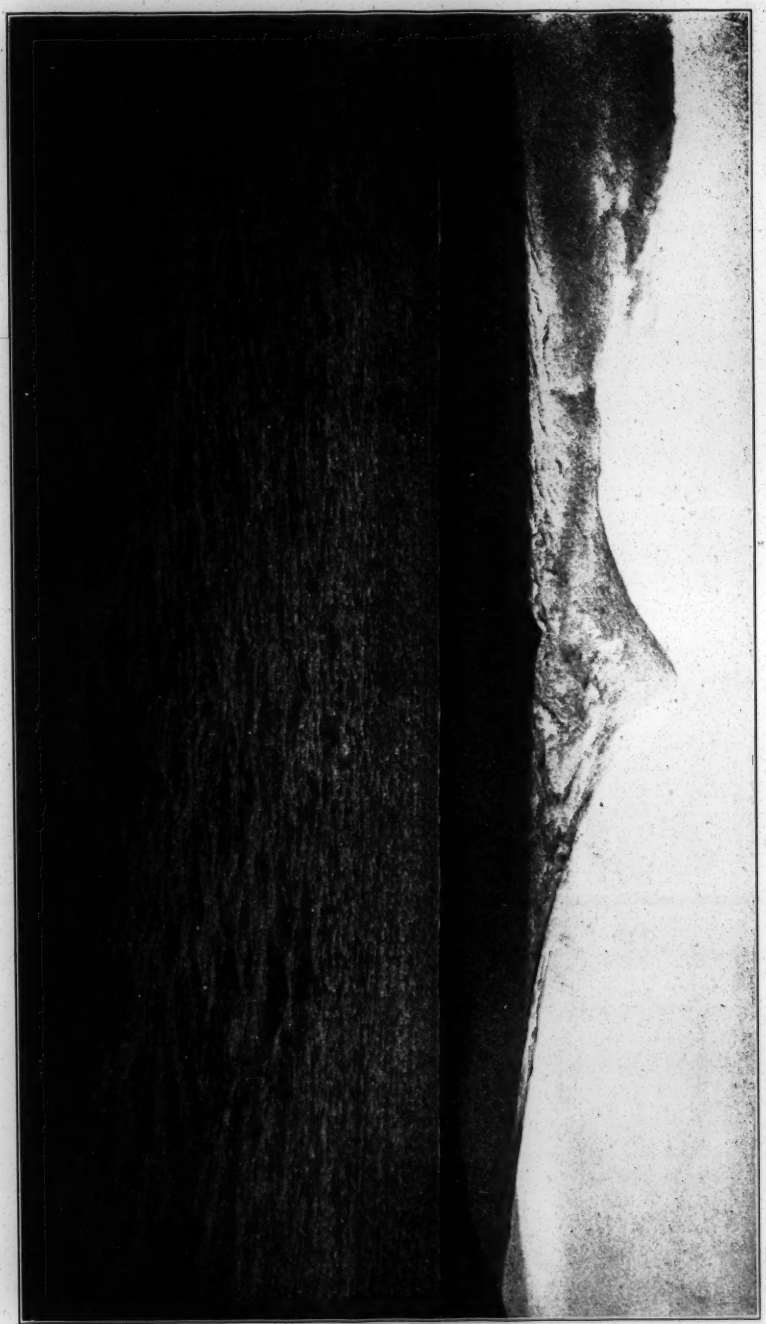
issue at a much lower level streams which spread out into broad and shallow water-courses (apparently dry at this season of the year) over the very gentle slopes to the sea. These lower slopes seem to be covered with ashes and scoriæ, and when the wind blows clouds of dust are driven along with them. The ridge connecting Shishaldin with its neighbor to the eastward is probably not more than 2,000 feet above the sea.

ISANOTSKI PEAKS

Eight and a half nautical miles east-northeast from the summit of Shishaldin are the double peaks of Isanotski Mountain. When these peaks are closely studied in their varying aspects, from broad to slender, from Ikatan Bay and around to the westward of them in Unimak Bay, they are seen to be the remains of the rim of a crater disposed something like this.

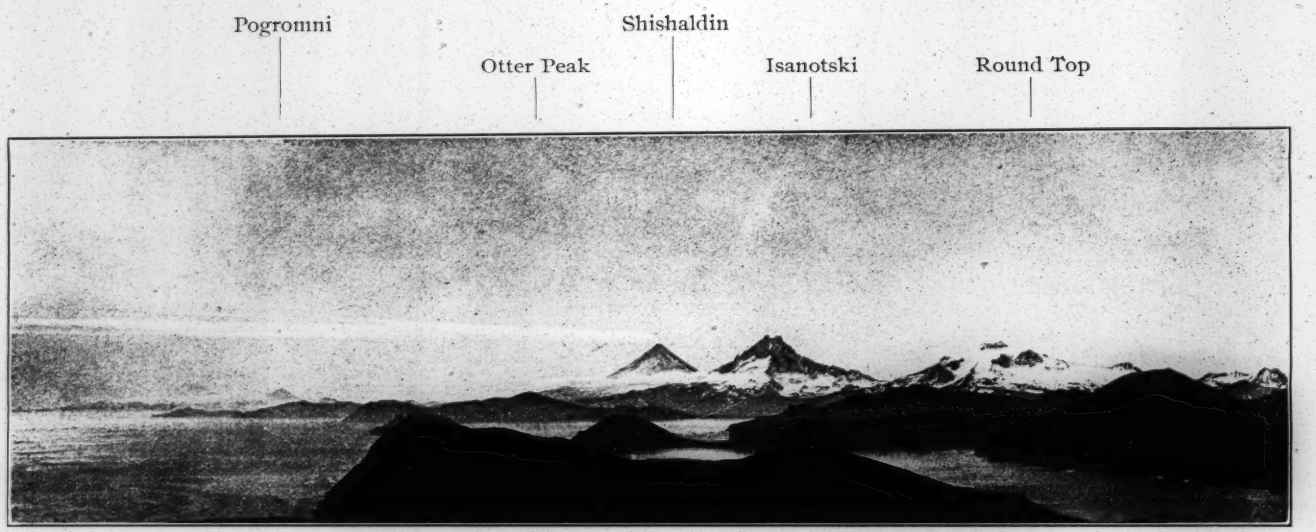


The points determined in the triangulation are the very highest pinnacles on the two remnants of the rim. If this theory is right, the mountain may at some time have rivaled Shishaldin in



Beginning of Pinnacles Ridge

Shishaldin from Anchorage Just West of Pinnacles



View from Near Pankof △

The long streamers of smoke from Shishaldin shown in the illustration can sometimes be seen on a clear day. The picture shows very distinctly the double peaks of Isanotski

height. Its sides are extremely rugged and apparently somewhat concave near the summit, as if the mountain had been hollow and the accumulation of ice and snow about it had crushed its sides inward. In broaching this theory to Mr Applegate, he informed me that an old native, recently dead, claimed to have seen this mountain crumble. I can scarcely believe that such a catastrophe, if it has taken place at all, happened at so recent a date without attracting the attention of some of the Russian traders living among the natives. The fact that the mountain is still so rugged, that the chasms created by the supposed caving in are not yet filled by the annual accumulations of snow, as on both of its neighbors, would seem to favor a comparatively recent date.*

Five miles northeastward from Isonotski is probably also an extinct volcano. It is apparently the highest of a group of peaks on the northeast end of Unimak Island, and has a rounded broad summit of snow and ice, through which only here and there is seen a projecting dark mass of rock even in midsummer.

POGROMNI VOLCANO

Pogromni volcano is the highest peak in the mass of mountains forming the western end of Unimak Island. It does not seem to rise from the main ridge, however, but from the eastern slope of it. A short distance to the eastward of it is seen a much lower peak, almost its exact counterpart in appearance, but much smaller in dimensions. Pogromni is a regular cone in outline, but its sides seem more angular and rugged than Shishaldin and its rocky ribs and projections more numerous and bare. We saw no smoke issuing from it at any time this season, but we have not seen much of the mountain, except while making this reconnaissance. I have a faint recollection of having seen smoke issuing from it in August, 1866.

Faris* and Westdahl* are two snow-covered peaks, apparently rising from the main ridge of this part of the island to the southward of Pogromni.

THE SOUTH SHORE OF UNIMAK

The region to the northward of Cape Lazaref consists of isolated mountainous elevations, knit together by low level land, composed largely of sand. The northern slopes, however, were not seen from the ship. That this low land extends back of the mountains forming Cape Lazaref is inferred from what was seen by the officer who occupied several triangulation stations on the coast. These low lands, like those of the Ikatan Peninsula, are probably covered with lakes, as many small streams issue through their sandy margins into the sea. Cape Lazaref, or the rocky mass so named on the chart, consists of three high points, which, for convenience, might be designated as east, middle, and west Cape Lazaref. The east cape is highest and broadest toward the sea, the middle next in height, but not projecting so prominently, and the west cape the lowest and sharpest. The east cape has a few rocks close under its extreme point, one of which is about 30 feet high and shows prominently from the anchorage in Otter Cove. There

* Less than 200 miles from Shishaldin are two volcanoes, known as Old and New Bogoslof. The first was born a little more than a century ago, rising from the depths of the ocean; the second rose from the deep probably not more than 30 years ago. Old Bogoslof was reported in 1832 to have had a height of 1,500 feet, but is now only half that height. Both volcanoes are constantly disintegrating and wearing away. For the remarkable history of the two Bogoslofs, see the article on "Bogoslof, Our Newest Volcano," by Dr C. Hart Merriam in "Alaska," the report of the Harriman Alaska Expedition, vol. II, pp. 291–336; New York, Doubleday, Page & Co., 1901.

* Named by the Superintendent of the Coast and Geodetic Survey, Mr O. H. Tittmann, after the officers who first determined their geographical position.

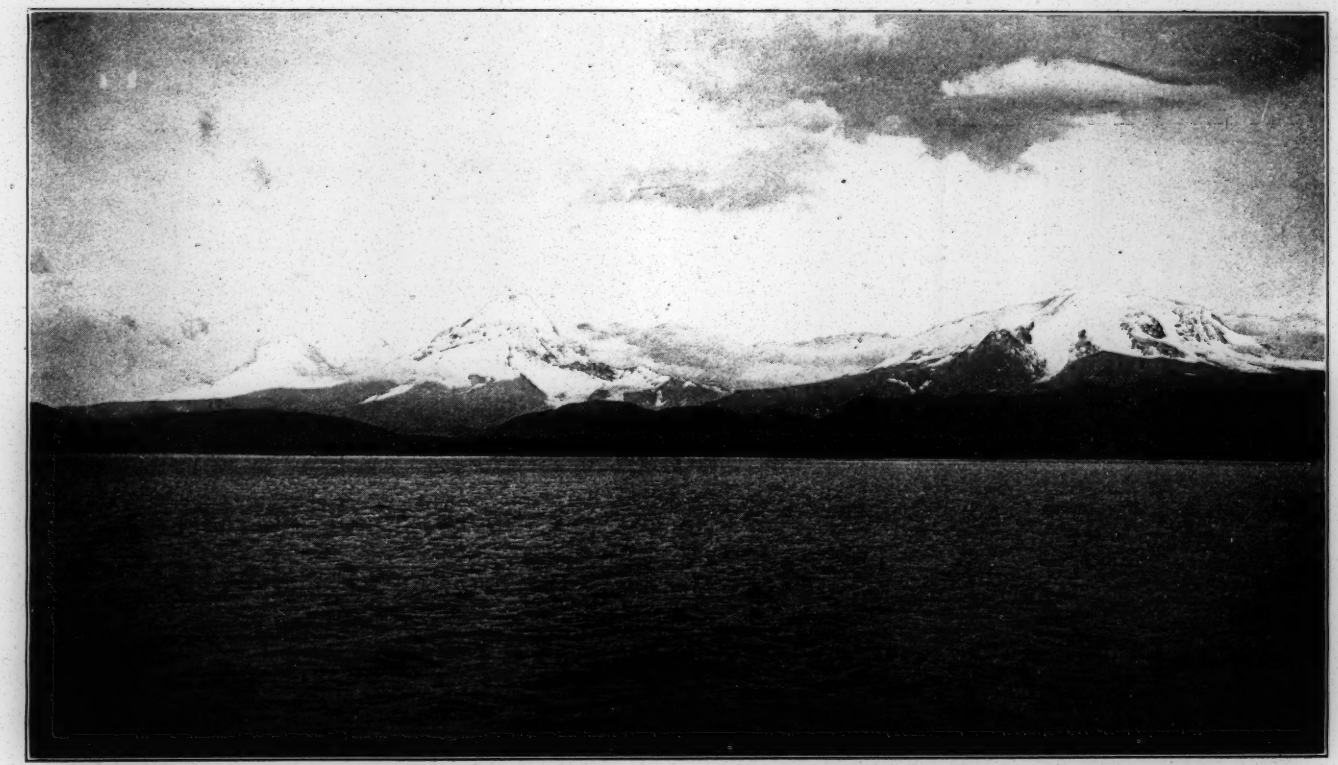
are also some scattered low rocks close under the cape all along its seaward face. The middle cape is clear of rocks, except a high pinnacle, so close under its southeast face as to seem a part of the rocky cliff, except from certain directions. The west cape, or Lazaref proper, has a reef projecting one and one-tenth miles southeastward from its extreme point, consisting of two high rocks, one about 150 feet above the sea and one about 70 feet midway between them, all showing as pinnacles from the southeastward, but broad from all other directions, and a multitude of low rocks quite close together. This reef forms a fairly good protection in westerly winds for an anchorage to the eastward between the outer high rock and a small bunch of rocks lying one and three-tenths miles from the eastern face of the cape.

The sandy shore is continued to the westward of Cape Lazaref, with somewhat higher dunes upon it immediately back from the beach. Six-tenths of a mile from this beach and 1½ miles westward from the cape lies a small rocky island about 130 feet above the sea and having a smooth, grassy top. At 3½ miles westward from Cape Lazaref the low shore, forming the sea frontage of the broad valley or flat back of the rocky masses which constitute the cape, ceases, and a high spur from Isanotski Mountain reaches almost to the sea, there being but a narrow fringe of sand beach in front of this 2½-miles-wide sea face of the mountainous projection. This sand beach is of comparatively recent formation. The cliffs of the face of this spur show evidences of wave action, and are in shape and color similar to the cliffs of Cape Lazaref. From aloft on the ship it could be seen that this is true also for many miles of the east side of this spur bordering on the low land.

At a point eight miles westward from Cape Lazaref the sandy beach is broken by the toe of a lava flow, probably from Shishaldin volcano, about one mile wide on its sea face, about 20 to 30 feet in height, and consisting of black, very jagged, and forbidding-looking rocks. Immediately back from the sea face the lava is covered with sand and thin vegetation. The sand beach is again broken through at 6¾ miles from this lava flow by a low ridge, about 2½ miles long and in a southwest and northeast direction, and rising into three conical hills, of which the northeasternmost is the highest, the middle the lowest, and the southwesternmost the only one whose base is washed by the sea and formed into several columnar rocks, of which only the outermost is entirely surrounded by water at low tide.

RUKAVITSIE CAPE

From Rukavitsie Cape there is an unbroken sweep of low sand beach, backed by low sandy bluffs and dunes for 13 miles, first southwestward, then curving gradually until its final direction, for two miles before it ends, is south. This forms the northwestern shore of Unimak Bay. Back from this beach from 1½ to 3 miles, in the most receding part of this bight, are hills rising from several hundred to 1,400 feet, and farther back seemingly still higher ones, all comparatively solitary, from a plain 100 to 200 feet above the sea and sloping gradually upward to the ridge projecting westward from Shishaldin Mountain. To the westward of these hills, between them and the mountain mass forming the southwestern end of Unimak Island, is a broad valley, drained by a river which empties into Unimak Bay at a point of the sand beach distant 1½ miles from its southwestern end. Looking into this valley, at an estimated distance of three or four miles from the beach is seen a lava flow, apparently from the southwest toward the northeast, reaching more than half



Shishaldin Isanotski Round Top

View from West Side of Otter Cove

View of Pogromni, Faris, and Westdahl Peaks from Unimak Pass

way across the valley, with the water making a great bend around the foot of it. Examined through a telescope, it seems to consist of a jungle of sharp-cornered rocks, like gigantic pieces of broken glass, of a dull gray color, sloping very gradually toward the northeast.

The sand beach ends against the table-land about 350 feet high, projecting in an east-southwest direction from the mountain mass behind it, and forming at its extremity a small semicircular cove not quite half a mile across and open toward the north. We noticed two small houses in the cove, apparently close under the bluff, and also a small sloop, hauled out of the water beyond the reach of the surf, near them. There are some rocks close under the extremity of the point. Applegate has anchorages marked on either side of this point, I believe, and I have been informed that vessels have anchored in both places. The cove to the northward of the point is much more protected, and I have learned from a shipmaster well known to me that he has anchored there and had protection from southerly winds, but not from the swell which rolls around the point. The bottom is sandy and shoaling toward the beach very gradually. At the southern end of the broader bight, to the southward of the point, there is a high table-land, 540 feet above the sea, and with an ocean face of one mile in length in an approximate northwest and southeast direction.

OPENING OF THE ALASKAN TERRITORY*

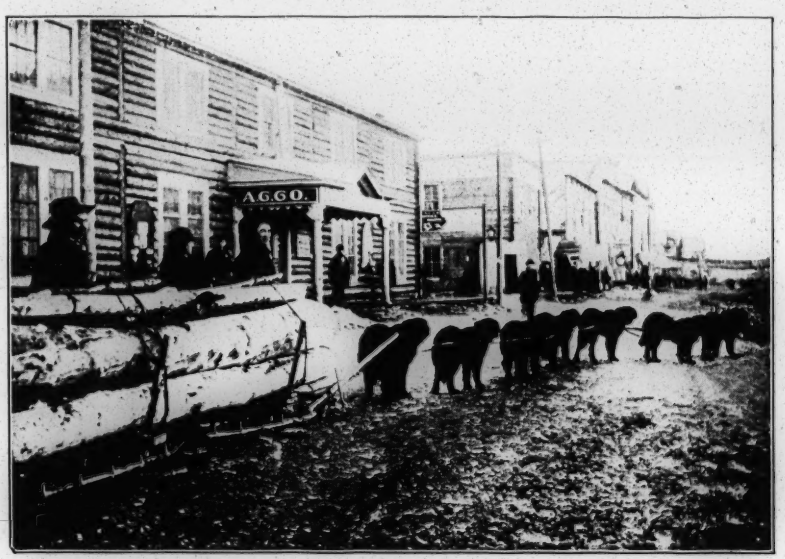
BY HARRINGTON EMERSON

THE West, the old West of boundless natural resources and pathless solitude, to yield homes for millions yet unborn, is not exhausted. Governments and peoples do not realize it, but it lies there to reward the pioneer with greater and quicker returns than have been given by any part of western Europe or of temperate North America. The new and unsubdued West today is Alaska, almost to a mile one-half larger than the thirteen original American colonies, very nearly twice the size of California, Oregon, and Washington, as large as Great Britain, Denmark, Sweden, Norway, and the German Empire, and with a better climate and greater natural resources than an equal area of northern Europe supporting 10,000,000 inhabitants.

The Yukon, the fourth largest river in the world, navigable for more than 2,000 miles above its mouth and running in a great semicircle from southeastern to northwestern Alaska, forms a natural highway. All this was known long ago, but it was not known that the interior contained thousands of square miles of farming lands and almost limitless areas of the richest mineral lands in the world. It is in this unsubdued country that thousands of miles of railroad must be built, that great areas will open for settlement, absorbing and keeping busy 2,000,000 workers as fast as they choose to go.

Had it not been for the natural summer highway of the Yukon, there never could have been such a camp as Dawson. The head passes of the Yukon and the river itself were at that time the only possible direct road to the Klondike.

* This article was published in *The Engineering Magazine* for February, 1903, and is reprinted here in somewhat curtailed form by courtesy of the editors of that magazine.



Courtesy of The Engineering Magazine

Winter Freighting Overland, Dawson, Yukon Territory

Courtesy of The Engineering Magazine

Landing Through the Surf at Nome

Under such conditions the pack horse adds little to the solution of the problem. He cannot both work and forage. Men "packers" were at one time paid as high as 60 cents a pound for packing over the Chilcoot Pass, but the rate had been 10 cents. Over the White Pass, where horses could be used, the rates were never lower than 10 cents, and often 20 cents. Horse trains were maintained only by a constant fresh supply of horses from the south, few animals surviving more than two or three trips. Of 3,800 horses taken north in 1897, all but 30 died on the trail. To cheapen transportation a wagon road was hastily built in 1898 and a toll levied of 2 cents a pound. In 1899 this was succeeded by a railroad, and freight rates have fallen from the original maximum of 60 cents a pound for 40 miles, from water to water, to $3.75 to $5.50 per hundred pounds for the 2,500 miles from San Francisco or Puget Sound to Dawson. It is 112 miles by rail from tide water over the 2,800-foot pass to White Horse, below the dangerous rapids of the upper river, and to Dawson by the river it is 451 miles further. The fare from Skagway is $70, and the fastest time made, 32 hours.

In the year 1901 the White Pass Railroad carried 33,471 tons of freight and 16,472 passengers, receiving from passenger traffic $252,932.71, and from freight, express, mail, and telegrams, $1,505,132.64, an average for freight of $43 a ton for 112 miles. Operating expenses, naturally heavy, were 42.42 per cent of the receipts. The first cost of this road, including many expensive franchises and the buying up of possible rivals, was $4,250,000, and in the first season its gross receipts were officially reported to exceed $4,000,000, with operating expenses of about $1,000,000. The actual facts as to this highway into Alaska and the Yukon Valley are given to show the great difficulties and expense of transportation in opening up a new country, where in spite of a rapid fall in rates after the first season, a successful transportation enterprise will usually pay for itself with one year's earnings.

It causes regret to Americans that this brilliant undertaking, conceived and executed by American engineers, could find no American backers—that London, unhampered by the timidity which afflicts New York in presence of a new region, boldly and promptly investigated, financed, and carried it through. The headquarters of the road have been moved from the United States to Vancouver, and the great bulk of the freight is no longer from the United States, but almost wholly from Canada.

Besides having enjoyed thus far the monopoly of the shortest entrance to the Yukon Valley, the White Pass will remain the only approach to the rich Atlin country, a lake region just beyond the coast range, which is slowly but surely developing, producing this last season nearly $1,000,000 in gold. Atlin and the Upper Yukon country will always be exclusively tributary to this road. As there is no other pass through which a road can be built, for an indefinite period the revenues of the White Pass route may be counted on to increase, but of the rich Klondike region with Dawson as its center it is likely very soon to be dispossessed. From the Stewart River 72 miles above Dawson to Nulato below the Koyukuk River, a distance of just a thousand miles, there are nearer and better seaports than Skagway. The best of these is the bay of Valdes, 10 miles long and 3 wide, as protected and beautiful as a Swiss lake, and nearest of all salt-water harbors to Dawson.

In 1900 and 1901 Major Abercrombie built a government trans-Alaskan military trail from Valdes into the Copper River Valley. Last winter over this road the freight rate to Copper Center, 103 miles, was 48 cents by dog team; during the summer by pack horse it rose to

$1.50 per pound, as mud is much more difficult traveling than snow and ice. In October, 1900, the mail schedule from Valdes to the American Yukon was reduced to twenty days, and in April, 1901, the trip was made by the mail carriers in thirteen days. Beginning the first of January, 1903, the mail contractors put on a weekly stage, four trips each way monthly between Valdes and Dawson. This winter, for the first time, it will be possible for American mails and American passengers to go to the American Yukon as quickly and as cheaply as over the Canadian route.

Courtesy of The Engineering Magazine

Hauling the United States Mail with Reindeer, Nome, Alaska

Five large ocean steamers, besides many sailing vessels, run each month between Puget Sound and Valdes, which is also connected by telegraph line with Eagle, Dawson, and the outside world. The increase of travel by this route is due to the discovery that the Copper River valley promises to be a great agricultural region, capable of affording homes to thousands of settlers, who will go there not because they can start bonanza wheat farms, but because the proximity of the great mining camps will give them a very high return for all they can raise. Fresh milk and butter, eggs, and poultry, fresh beef and mutton, hay and oats for animals, fresh vegetables for men, command fancy prices. John F. Rice, quartermaster's clerk, in his official report to Major Abercrombie, states that the city of Eagle is second only to Dawson in importance; that the route from Eagle to Valdes presents no such obstacles as routes through the Rocky Mountains or Cascades; that there is an abundance of grass from May until October; that the natural food resources of central Alaska are caribou, moose, brown and black bear, mountain goat, geese, duck, grouse, salmon, pickerel, perch, bass, whitefish, trout, pike, and grayling.

It is, however, not the agricultural resources that will immediately attract the largest influx of population and capital. About 140 miles from Valdes, in the Chitina Valley, are very great

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Winter Freighting on the Ice, Lake Linderman

copper deposits, which during the last season have been visited by many experts. Some of the ores run 85 per cent copper, and there are many thousand tons in sight assaying 16 per cent. A great mountain slide has occurred in this region, revealing, it is claimed, as much as 40,000,000 tons of high-grade copper ores. Valdes Bay and the lower pass north of it are the American gateways to the Yukon Valley, and already a railroad has been surveyed and partially graded to the interior, for the copper, which, though it can be quarried like the iron ores of Lake Superior, without a railroad will remain worthless. The railroad itself is assured an unlimited tonnage. It is the shortest line to Dawson and the Yukon Valley, and, what is of more importance, it can carry supplies delivered at Valdes from sailing vessels or deep-draft ocean steamers in all the months of the year, with only one break of bulk at Valdes, and also reach the deep navigable Yukon and the Koyukuk a month earlier than by the Yukon mouth, which is closed by Bering Sea ice until July 1. As shown in the history of the White Pass Railroad, the ingoing traffic would be in itself sufficient to warrant a railroad, but from Dawson the only export is gold, about 70 tons a year, while this road will not only carry all the United States Government troops and supplies, for which many hundred thousand dollars are spent, but it will have the unlimited outbound tonnage of high-grade copper ores, which, with a freight rate of $2 a ton from Valdes to the smelters of Puget Sound, will scarcely be treated in the interior.

It is not too much to expect that improvement in transportation facilities alone will convert central Alaska into as densely a populated and prosperous a region as Colorado, as the Black Hills of South Dakota, as the rich mining region of British Columbia.

There is another part of Alaska waiting for transportation facilities. It is not so dazzling as the Klondike nor as

Courtesy of The Engineering Magazine

Freight Boat on the Niukluk River—Carries 7 Tons

The horse tows it upstream, riding down in the boat

vast as central Alaska, but it is perhaps richer than either of them.

Far to the northwest lies the Seward Peninsula, suggesting on the map an animal's head snarling across Bering Strait at the nearby Siberia. By rivers and sea it is almost wholly separated from the mainland, and though comprising but 3 per cent of the area of Alaska, or 20,000 square miles in 600,000, it has yielded for the last three years nearly 75 per cent of the gold output, in spite of the increasing yield of the great quartz mines of the southeast, near Juneau.

Although the most distant region of North America, 2,700 statute miles from Puget Sound, it owes the rapid exploration and development of its coast to the fact that an all-water route was open to its shores, and that freight still costing a minimum of $70 a ton into Dawson is being landed on the Nome beach for $10 a ton. Passenger rates, higher in the first rush, have fallen to $40 and $50 first class and $20 or $25 steerage. Owing to the freedom from hardships, as well as the low coast and shortness of time required, impelled by stories that were indeed true of rich golden beaches, about 25,000 people and their chattels landed on the low sandy spit at Nome and were left to the mercy of surf and storm. The Eskimo, very numerous along this coast, who have none of the aloofness of the Indian, came in their umiaks, big skin boats that can carry fifty people and all their belongings, and made camp with the whites; but the Eskimo, needing no barometer, intuitively flee several days before a storm. Not so the whites, who every year have been caught. In September, 1900, when there were more than 12,000 campers along the beach, the surf rolled in, wrecked much of the shipping in the offing, and destroyed about $1,500,000 of miscellaneous property on the beach, and every year since, similar if not so severe disasters have occurred. Driftwood, piled high landwards from Nome,

shows that on occasion the sea sweeps the whole site of the present city.

This is not the only danger. Another is fire. The streets are narrow, and the houses—flimsy wooden structures—stand in serried rows. Because of the cold, there are hot fires everywhere. There are few brick chimneys, and in winter there is no water supply. If a serious fire should occur in midwinter, destroying shelter, food, and fuel, no relief could reach the stricken people. The nearest open port on the Pacific is 500 miles to the southeast. It is 1,711 miles from Dawson, with no roads to either place. Bering Sea is in the same latitude as the Baltic, and, like the Baltic, is shallow and brackish, owing to the many rivers which empty fresh water and silt into it. In winter surface ice readily forms, extending 300 to 400 miles south of Nome, effectually isolating the city from November 1 until June 1.

This is unendurable, and three projects are under consideration to effect communication throughout the whole year. The simplest is to maintain in Bering Sea an ice-breaker of the *Admiral Ermak* type, an easy task, as the ice is not as thick and solid in Bering Sea as in the northern Russian ports. The second project is to build a railroad from Cook Inlet or Prince William Sound on open Pacific waters to Nome by way of St Michael. The third plan is to connect Nome by railroad with the lower Yukon River, and ultimately effect a junction with the railroad from Valdes to Eagle. To complete this project would require about 900 miles of track.

The gold yield of the Nome region has hitherto come from the sea beaches and from gulches and beaches at most 10 miles from water transportation. Even 10 miles has proved almost prohibitive. In winter the placers are not worked and the camps are closed. No advantage can therefore be taken of the smooth snow and ice roads. In summer the tundra is two or three feet of mud, with a bottom of frozen ground. The services of teams are worth from $20 to $40 a day, and it takes a whole day to haul 1,500 pounds 10 miles. The lowest rate is three times as much as the minimum from Puget Sound to Nome, 2,700 miles, and twice as much as the rate from San Francisco or Puget Sound to Dawson. So prohibitive were the natural conditions that Mr Chas D. Lane, of the Wild Goose Company, considered it wise economy to devote 90 per cent of the output of certain placer claims to a transportation system, thus reducing cost of exploitation for all future output to 10 per cent, rather than indefinitely to spend 90 per cent of the yield for transportation alone.

The Wild Goose Railroad, 7 miles long from Nome to Anvil Creek, earned its total first cost within thirty days of its opening and shows increasing earnings each year. From Council City, on the Niukluk River about 90 miles from Nome, Mr Lane has built a second road, also 7 miles long, connecting Council with Ophir Creek, and this road has also paid for itself in one season. Council is 55 miles from the nearest seaport, up a shallow, winding river. That part of the Seward Peninsula on which Nome is located, a part about 5,000 miles in area, was, geologically speaking, very recently an island. A deep indentation of the ocean runs 50 miles inland from Port Clarence, northwest of Nome, and Golofnin Bay, about 70 miles east of Nome, also extends many miles inland. These two bays are joined by a deep valley, so that 60 miles north and inland from Nome it is possible with one short portage to go from sea to sea. Council City lies in this depression, Ophir Creek and innumerable other rich creeks emptying into it from both sides. Gold has been found in paying quantities on nearly all of them, but it is impossible yet to de-

velop them, owing solely to the cost of transportation.

Owing to the absence of transportation facilities, nothing is being done further inland, but a railroad from the nearest port to the interior, a narrow-gauge railroad, should pay for its cost each season for many years to come. There are no heavy grades, no mountain work, and for many miles it runs through a heavily timbered country, but west of Council there is no timber, and both lumber and fuel are exceedingly high in price. There is not only gold here, but also what gives promise of being one of the richest lead and silver districts in the world. Seventy miles inland from the ocean, up the Fish River and its tributary, Omilak Creek, less than 50 miles by railroad survey, silver and lead ore has for 18 years past been quarried out, the ore running from 70 per cent to 80 per cent lead and about 120 ounces of silver to the ton. Much ore lies sacked on the dump, but in small quantities of several hundred tons it costs more to move it than it is worth, although its smelting value exceeds $100 a ton. From Golofnin Bay there is a freight rate of $3 a ton to the Tacoma smelter, but the wagon haul to the river and the transportation down the river is as yet prohibitive. This one quarry, if properly equipped and opened, should yield a minimum of 10,000 tons a year.

For Pacific Coast maritime evolution Alaska has been of inestimable advantage. The Dawson rush of 1897 and 1898 impressed every available boat, and when it was over left well established lines with almost daily service. The Nome rush of 1900 again caused a demand for all available craft, and in summer the regular service keeps a fleet of more than a dozen ocean steamers busy. The Valdes developments even now justify weekly sailings. All the worn-out dilapidated craft of American register drift into these runs, and as the Alaskan coast is for the most part uncharted, unbuoyed, and unlighted, many of them find their graves in northern waters.

The export trade from Alaska for four months ending October 31, 1902, exceeded $20,000,000, and was equal to that from Hawaii (for ten months ending the same date), was three times that of the Philippines, and more than double that of Porto Rico. The island dependencies of the United States are densely populated, small in area, and fairly well developed. They are in the tropics, and unfit for white men and their families. Alaska needs 10,000 miles of railroad, 20,000 miles of wagon roads and telephone lines, and can, as fast as transportation is available, give homes and employment to a population of 10,000,000.

THE FORESTS OF CANADA

THE immense forest resources of Canada are not generally realized outside the Dominion. Hence the statements contained in a recent report from U. S. Consul Henry S. Culver, at London,* Ontario, about the Canadian forests are specially striking. The following is abstracted from the report:

There are three great timber belts in the Dominion: The northern or spruce belt, the southern or commercial belt—both east of the Rocky Mountains—and the British Columbia belt, west of the Rocky Mountains. These belts do not

*"Advance Sheets of Consular Reports," January 31, 1903 (No. 1559).

include, however, the forests of the maritime provinces, which are extensive and valuable, covering about one-tenth of the area of Ontario and Quebec, or the forests of New Brunswick and Nova Scotia, which may be compared in a general way to those of Maine.

FORESTS OF BRITISH COLUMBIA

The western or British Columbia belt is far superior to either of the eastern areas, for the reason that the climate, tempered as it is by the warm waters of the Pacific Ocean, promotes a more perfect growth and development of the different species. Here is found not only the valuable red fir or Oregon pine, generally distributed throughout the entire province along the coast and on the mountains, but also the red cedar, the western spruce, the yellow cedar, the hemlock, the balsam fir, the western white pine, the western yellow pine, the maple, and the western oak in such quantities as to make this the most valuable timber belt on the North American continent. This belt extends from the forty-ninth parallel north to the sixtieth parallel, a distance of some 770 miles, and is from 200 to 300 miles wide. The best timber does not extend to the extreme north. That portion is covered with black and white spruce, and constitutes a very extensive pulp-wood range.

But this region, because of its great distance from the markets in the East and the lack of cheap transportation, will remain comparatively in its primeval state until the eastern forests are nearly exhausted or until better transport facilities are afforded.

THE NORTHERN FORESTS

The northern belt is perhaps greater in extent than all the other timber belts and reserves of Canada combined. According to the best authority, it extends from the eastern coast of Labrador north of the fiftieth parallel in a northwesterly direction to Alaska, a distance of some 3,000 miles, with an average width of perhaps 500 miles. This vast strip of timber land, if placed upon the territory of the United States, would extend from Maine to California and from the southern shore of Lake Erie to the northern boundary line of Georgia. It is known as the spruce forest of the Dominion, the great bulk of the timber being of that species, black and white, the other important trees being larch and poplar.

Although this belt has been but partially explored, it is claimed that many of the trees in the southern portion are of a lumber-producing size, but the greater portion is fit only for pulp.

When it is considered that spruce is distributed in vast quantities through all the forests of Canada, and that an almost incalculable amount will be produced in this great northern belt, it is hardly exaggeration to say that the Dominion possesses an inexhaustible supply of pulp wood.

Dr Robert Bell, Director of the Geological Survey of Canada, says of the area of the forests :

"The area of our northern forests may be reckoned as forty-four times as great as that of England. Any one of these forty-four parts will produce wood enough to supply the ordinary demands of the present population of Canada—that is, 5,000,000 people could get what is required for mining, fuel, etc., by taking the timber from a space the size of England—and would be able to allow the other forty-three equal parts to be in reserve or used for export."

The railway being built from Sault Ste. Marie to Hudson Bay will make available the timber growing around the bay and along the line of the road, and may possibly provide a more accessible field of pulp wood than can be obtained in any other way for the rapidly growing industries of the Soo.

THE SOUTHERN BELT

The southern or commercial timber belt spreads over a very wide territory. It comprises that portion of Ontario and Quebec lying between the forty-fifth and fiftieth parallels of latitude and bounded on the east by the St Lawrence River and on the west by the Great Lakes and Manitoba. Great interest centers in this great timber region by reason of its proximity to the manufacturing centers of the United States and because it contains the most valuable timber for lumber east of the Rocky Mountains.

It is not, however, a compact and unbroken belt of first-class timber. Climatic conditions seriously interfere with the development and growth of some of the best species of timber that inhabit this region, for none of the best ones extend farther north than the watershed between Hudson Bay and the Great Lakes, approximately the fiftieth parallel of latitude, and many of them find their northern limit far south of this parallel. The composition and extent of this timber belt can be better understood by taking a map of the Dominion and tracing its boundaries and noting the northern limit of the most valuable species. The forty-fifth parallel cuts out entirely one very valuable species—the black walnut—whose northern limit of growth is the latitude of the city of Toronto, while a few miles north of this parallel is the northern limit of red cedar and white oak. A line drawn from the city of Quebec to Sault Ste. Marie will designate the northern limit of beech, while a line drawn from the northern part of New Brunswick to the north shore of Lake Superior will mark the northern boundary of sugar hard maple. Two other species which have their northern limit within this belt are elm and birch.

The king of the northern forests is white pine, which has its northren limit, as have also white cedar and red pine, at this fiftieth parallel of latitude. This region is now virtually its only home in the Dominion of Canada. It was at one time supposed that it had a very extensive northern range, but Dr Bell states that its distribution is comparatively southern, very little being found north of the fiftieth parallel.

This belt would furnish an enormous supply of excellent timber but for the destruction wrought by forest fires.

Dr Bell calculates that about one-third of this territory may be considered as under a second growth up to about 10 years of age, one-third as intermediate, and one-third including trees of 100 years or more, and this applies doubtless to all the forest areas of Canada; to this particular belt, which lies at the very doors of the great manufacturing establishments of the United States, and is the one foreign timber region upon which we rely, the available supply of first-quality timber is alarmingly limited.

The Canadian forests have never been called upon to pay the enormous tribute to multiplying industries that our forests have; but they have been decimated by the speculative lumberman and the improvident settler, and ravaged by fire until those which are most accessible bear little resemblance to their primeval state.

But it is not too late for the Canadian people to preserve what is left of their great timber reserves, and by a vigorous and judicious system of reforestation, they may be able to meet every demand for their best timber for a long time to come. They are awake to the responsibility, and are taking measures to preserve what is left and to reforest the waste places.

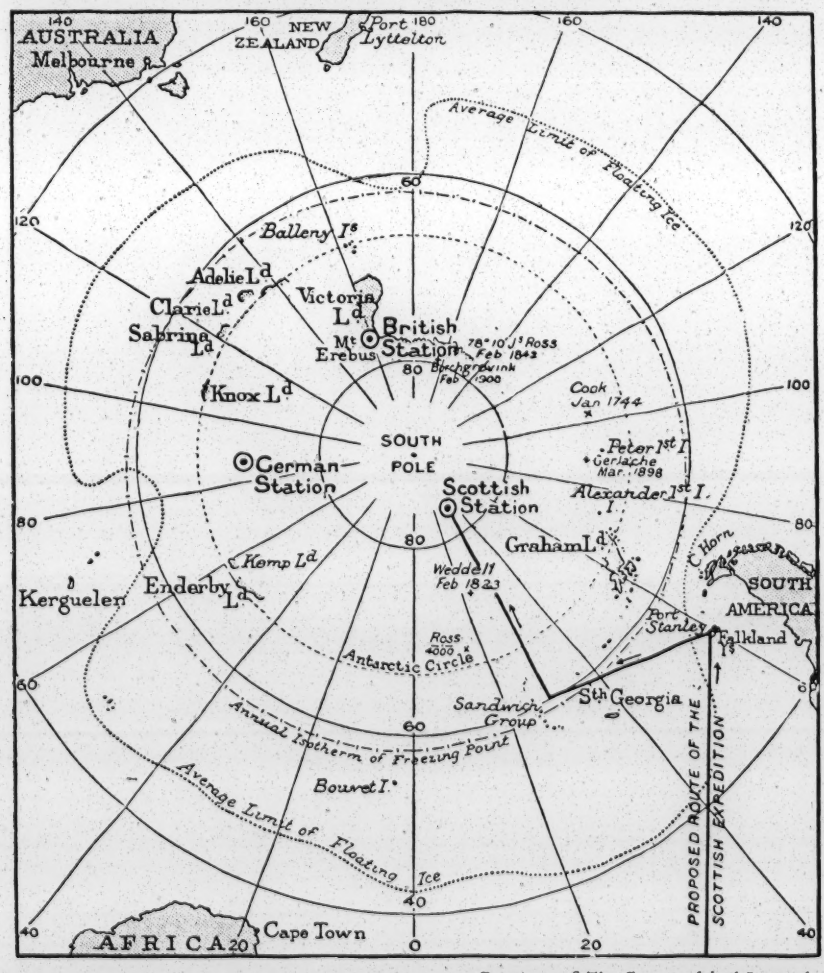
WORK IN THE FAR SOUTH

THERE are four expeditions at present exploring the far south whose unknown area is greater than twice Europe. The outline map shows the base of operations of three of the parties—the English, the German, and the Scottish; the fourth party, the Swedish, have their base near the Falkland Islands.

Nothing has now been heard from the German expedition for more than a year. They are amply equipped and provisioned and did not expect to send word of their doings before June, 1904.

An auxiliary vessel, the *Morning*, recently entered the Antarctic regions, carrying additional equipment for the British expedition, which is exploring south of New Zealand.

The Scottish expedition, under the command of W. S. Bruce and on board the *Scotia*, sailed from the Falkland Islands for the far south in January, 1903. The other three expeditions have had a year's start of the Scottish expedition, but the latter has an able leader and staff, and will doubtless do equally important work.



Courtesy of The Geographical Journal

THEORIES OF VOLCANIC ACTION

IN an address recently before the Swiss Society of Natural Sciences, M. A. Rossel presented certain considerations regarding volcanic action based on experiments with the electric furnace. *The Literary Digest* gives the following summary of the address:

"A quartz crystal heated in the electric furnace at the relatively low temperature produced by 70 volts and 400 to 500 ampères is completely volatilized; it is even easy to vaporize lime, magnesia, and in general all compounds containing oxygen, such as silicates, carbonates, etc.

"Nevertheless, these may undergo a process of reduction; when we heat in the electric furnace silica with alumina, carbon, iron, etc., new refractory substances are formed, which remain in the furnace while the oxygen is disengaged in the gaseous state. These stable compounds are carbids, silicids, phosphids, etc., which resist high temperature, but are all decomposable by water.

"If we apply this reaction to the formation of the earth by cooling, we must admit that the first minerals produced were compounds of elements . . . free from oxygen. These minerals remained in this condition, forming the first terrestrial stratum, until circumstances permitted the formation of water or water vapor; as soon as they came in contact with this, a very active reaction must have taken place, whose result was the formation of oxids—lime, alumina, magnesia, etc., together with inflammable gases, whose combustion then gave rise to other reactions. . . .

"There were thus formed, on the one hand, earthy metallic oxids, and, on the other, the oxids that form the acids of the important earths—silicic and carbonic acids. The explanation of the formation of the silicates and carbonates is hence not far to seek.

"Now we may apply what precedes to the explanation of certain volcanic phenomena.

"The earth cools progressively. This cooling gives rise to folds in the terrestrial crust, and fissures may result. Through these fissures water is introduced and minerals containing water of hydration may penetrate to a great depth. Then very energetic chemical reactions take place, producing gases that will burn in air, and also metallic oxids. These reactions may cause earthquakes and volcanic eruptions.

"In any case, M. Rossel regards it as certain that if the earth has reached its present state by progressive cooling, and if the interior of the globe is now at a sufficiently high temperature to volatilize oxygenated bodies, oxygen should be entirely wanting at these depths. The oxygen will all be found at the surface of the globe, in the atmosphere and in combination in water and oxygenated minerals, which are all decomposed volcanic ashes. It would then seem inexact to say that the globe is composed of about four-fifths oxygen and one-fifth other elements. Besides, this hypothesis is not in harmony with what is known of the earth's specific gravity."

M. STANISLAS MEUNIER contributes an interesting and suggestive paper on the theory of volcanic outbursts to the *Revue Scientifique* of August 2, of which this abstract is published in *The Geographical Journal* for December, 1902, He assumes that from the surface down to a certain limited depth, determined by the temperature, all rocks are saturated with water, while beyond that depth the heat is too great for water to penetrate. A fracture of the nature of a reversed fault, caused by thrusting, would place a hot, dry layer below the critical level in contact

with a moist layer above it, with the result that the rocks along a part of the line of contact would have their melting point lowered, and would take up water in combination, tending to increase in bulk, and forming a mass having many of the properties of ordinary lavas. The swelling of the mass at a line of weakness would tend to fracture the superincumbent rocks. The relief of pressure so obtained would set free large quantities of the occluded gases and vapors, and these would bring with them rock materials in a solid and molten state. A close analogy occurs in the case of a bottle of soda water when the cork is taken out, the sudden liberation of the gas in solution driving part of the water out of the bottle. Thus volcanic lava, so far from being a material distributed as a continuous layer in all parts of the earth, is a special product of regions which have just undergone profound geological changes, and the significance of this in relation to the geographical distribution of active volcanoes is very great. Again, it becomes evident that the depths at which centers of activity—*i. e.*, "pockets" of swelling or expanding material—are developed may vary considerably, and we are able to account for the fact that volcanoes near one another may be quite independent, while others, more distant, may act sympathetically. Finally, lavas may originate in rocks of widely different constitution—from crystalline rocks to the carboniferous clays which produce anorthite lavas. The indispensable factor, the tendency to increase in volume, may of course be supplied by other substances than water, as, for example, by chlorides, like masses of rock-salt, which would explain the emanations from exceptional volcanoes, like those of Hawaii, where the place of water vapor is taken by hydrochloric acid or by sulphates or combustible carbon compounds.

GEOGRAPHIC NOTES

THE FOUNDER OF THE SMITHSONIAN INSTITUTION

WORD has been received that James Smithson, the founder of the Smithsonian Institution, must be turned out of his grave in Genoa, Italy, to make room for a quarry.

Smithson died at Genoa in 1829, and was buried in a small and isolated British cemetery on the heights of San Benigno. The cemetery is under the care of the British consul at Genoa, but the land belongs to the Italian Government. Near by is a quarry, from which the city gets the stone for its works. Much more stone is now needed for the extensive harbor improvements which have been begun, and hence all the graves in the cemetery must be removed.

Smithson left his entire estate of over half a million dollars to "the United States of America to found at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge among men."

The princely legacy came as a surprise to the United States. He had never visited this country, nor had he any American friends or, as far as we know, any correspondents across the ocean. His plan was unique and has given the United States a scientific institution such as no other nation in the world possesses. Today the institution which bears Smithson's name, in addition to the income of the Smithsonian fund proper, which amounts to about $30,000

yearly, has charge of the expenditure each year of $450,000. Exploration and all branches of geographical science have been generously encouraged and assisted by the institution during the half century of its existence.

The nation to whom he was so generous ought to insist in honoring the memory of their great benefactor by bringing him to this country and giving him a permanent resting place in the grounds of the institution which he founded. It would be base ingratitude on our part to bury him again in Genoa, in another cemetery, where, as time goes on and the city grows, he will be again disturbed. We should place him where he may rest in peace, not for another seventy-five or one hundred years, but for as long time as the great nation lives in which he showed such complete confidence and respect.

GAZETTEER OF THE PHILIPPINES

A "PRONOUNCING Gazetteer and Geographical Dictionary of the Philippine Islands" has been prepared by the Bureau of Insular Affairs of the War Department, and issued as Senate Document No. 280, Fifty-seventh Congress, first session.

The gazetteer proper contains 264 pages, including the index, while the geographical dictionary occupies 668 pages, exclusive of the maps, charts, and illustrations.

The work contains the most recent and authoritative information, from official and other sources, concerning the islands, relative to their geography, physical features, areas, communications, population, towns, resources, wealth, products, industries, commerce, finance, social economy, natural history, military occupation, and civil government, followed by an alphabetically arranged descriptive list of the islands, provinces, districts, pueblos, cities, towns, mountains, volcanoes, rivers, seas, straits, gulfs, bays, lakes, capes, light-houses, and other mapped objects and places to the number of 10,300.

The work is so extremely valuable that it is unfortunate the edition is so limited that only a few copies can be obtained by the public. Persons who are unable to obtain a copy from a Senator or Representative may purchase one from the Superintendent of Public Documents, Washington, D. C., for $1.75.

THE DEVELOPMENT OF CUBA

IN a previous number of this Magazine mention has been made of the very complete telegraph system constructed in Cuba by the U. S. Signal Corps since the Spanish-American war.* The system was turned over to the Cuban government when the United States withdrew from the island.

Another important work was completed recently when the railroad was opened that binds together the ends of the island. An English-American syndicate built the line. H. I. Davies, writing in *The Scientific American*,† has this to say of its value:

The railroad is of standard gage, and its bridges are of steel and masonry; its equipment will be similar to that of the best American railways, and it is intended to run through sleeping cars between Havana and Santiago de Cuba, a distance of nearly 900 miles.

Along the main line are to be found great areas of land of the richest description, well watered and in most cases well wooded, suitable for sugar cane, tobacco, Indian corn, cotton, coffee, cacao, and all of the fruits of the tropical and sub-tropical regions. Other districts are peculiarly adapted to cattle;

*See NATIONAL GEOGRAPHIC MAGAZINE, p. 407, December, 1902; also report of the Chief Signal Officer, Gen. A. W. Greely, for 1902, pp. 11–17.

†January 24, 1903.

Courtesy of The Scientific American

Diagram Showing the Railways of Cuba

cattle do well everywhere, for the grasses are luxuriant and highly nutritious, and there is usually an abundance of water. Around the coast are to be found many excellent harbors, and it is reported and believed that the unexplored part of the island contains much hidden mineral wealth.

The interior, which is sparsely populated, is comparatively level, and largely covered with hardwood timber, and while the soil of the different districts is generally of extraordinary fertility, some places are more desirable than others, both in this respect and in regard to healthfulness. For the tropics, the climate is a tolerable one, and the island will soon be rendered more healthy by foreign irrigation, drainage, and an improved system of sanitation. The northern employes of the Cuba company have as a rule been free from illness of any kind, notwithstanding their employment on railway construction under conditions not always favorable to health. Unlike many of the West India islands, Cuba is entirely free from poisonous reptiles, and has fewer mosquito and similar pests than any other southern regions.

There are no obtainable government lands in Cuba; practically all of the lands are held by individuals, and in the eastern half of the island they are usually held in large areas. No systematic land survey has yet been made, and the large tracts are mostly in irregular forms and their boundaries are difficult to define and trace; land titles in the unoccupied and in the newly settled parts of Cuba are in many cases defective and need investigation, though the government has recently taken steps toward the perfection of titles.

TIMBERLINE

IN the last number of the NATIONAL GEOGRAPHIC MAGAZINE* the distinguished geologist and physiographer, Prof. I. C. Russell, discusses the subject of timberline, and suggests the use of the term in at least three different senses. It is seldom that I find myself called upon to differ from this eminent authority, but in the present instance I feel it my duty to file a protest.

The term "*timberline*" has come to have a perfectly definite and well-understood meaning, accepted by naturalists the world over. *It is the upper or boreal limit of tree growth as determined by temperature.* To use the term in other senses, as for upper limits of tree growth *not* dependent on temperature, for lower or austral limits of tree growth on mountains or other slopes, for the line where

* Nat. Geog. Mag., vol. xiv, no. 2, pp. 80-81, February, 1903.

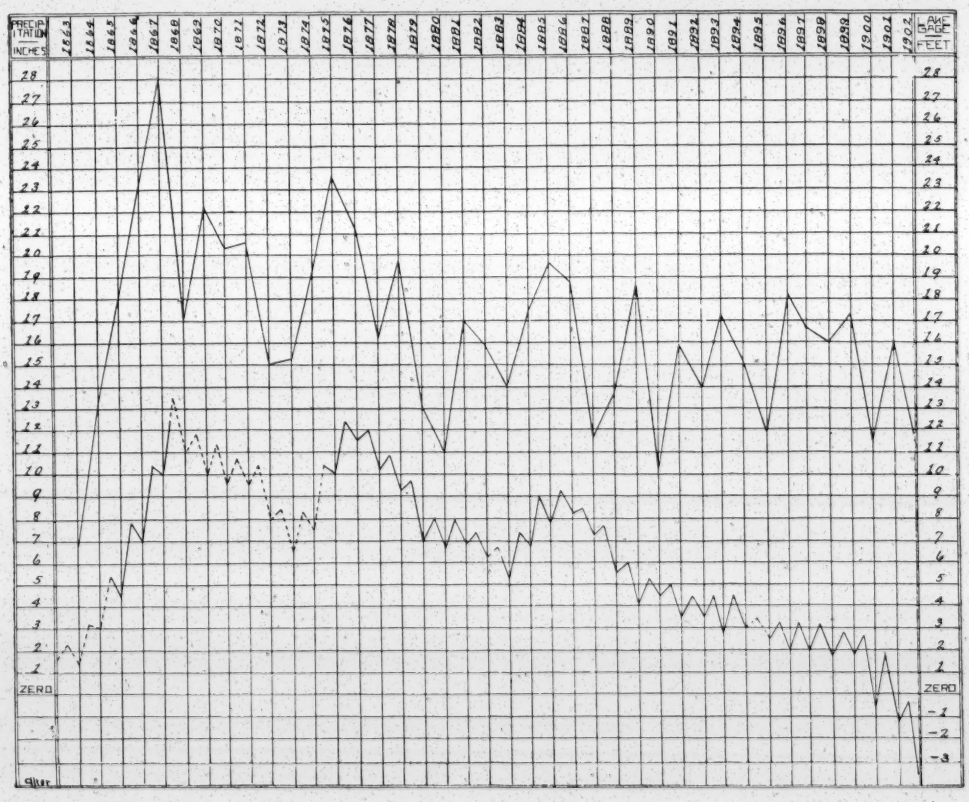


Chart Showing Annual Precipitation at Salt Lake City and Water Level of Great Salt Lake

EXPLANATORY NOTES.

The upper line indicates the precipitation and the lower one the lake level.

Broken lines indicate periods of no authentic observations, or that the data have been approximated.

This chart was prepared by Mr L. H. Murdoch to illustrate his article on "Why Salt Lake has Fallen," in the last number of this Magazine.

certain trees stop because of excess of water in the soil, and so on, is depriving the term of its fixed and definite value.

While on the subject of Professor Russell's note, I may be permitted to suggest further that the lower limit of tree growth in many parts of the West is determined by temperature rather than aridity, though in some cases aridity is the controlling factor. To avoid misinterpretation, it may be well to call attention to the self-evident fact that the temperature along the lower limit of timber on our western mountains is not, of course, too high for all tree growth, but too high for the particular kind or kinds of trees which flourish in that particular region. Thus the lower limits of the yellow pine and of the several species of juniper and nut pine are determined by definite temperatures. Other kinds of trees flourish at higher temperatures, but these trees have not access to the region.

C. HART MERRIAM.

BUREAU OF FORESTRY

THE work begun in 1902 by the Bureau of Forestry to check the advance of the sand dunes along the southeastern coast of the United States and in other sections of the country is being continued this year.

In southern Virginia and northern North Carolina a chain of immense sand dunes stretches north and south along the coast. These dunes are moving slowly landward, and within the last few years have become dangerous to the United States life-saving stations and to private property of large value. Some time ago, at the request of a number of private owners, the Bureau made an examination of a district in Currituck County, N. C., and began work at one point to fix the drifting sand sufficiently to permit forest planting. In coöperation with the owners of the land, board fences and other structures were erected to alter the course of the most threatening dunes. The work was so successful that last spring the ground was in condition for the planting of beach grass, which is being used temporarily as a cover. With a fair growth of grass this season, forest planting on from 30 to 50 acres may be begun this year. The forest, besides protecting the buildings, will yield a much-needed supply of fuel. At other points in the same district, which extends 30 miles along the coast, the Bureau is now giving similar aid.*

An investigation is also being made of the dunes formed by the drift sand along the Columbia River in Washington and Oregon. The dunes are destroying valuable orchards and rich agricultural lands. They form serious hindrances to transportation along the lines of the Northern Pacific Railway and the Oregon Railroad and Navigation Company. After a careful examination the Bureau will attempt to devise methods for controlling the movement of the sand. The Oregon Railroad and Navigation Company is assisting in the investigation.

ARGENTINA-CHILE BOUNDARY AWARD

THE decision rendered in the Argentina-Chile boundary dispute by King Edward VII is in the nature of a compromise. Argentina receives about 15,600 square miles of the disputed territory and Chile about 21,000. The area acquired by Argentina is the more fertile and valuable agriculturally and includes the upper valleys of several rivers flowing into the Pacific. Chile gains a large area of forest country and many square miles of upland, where large flocks of sheep can roam. The results of this dispute have been the

* See "Report of the Forester for 1902," by Gifford Pinchot. Pp. 135.

careful exploration and mapping of the boundary for nearly 1,000 miles. The decision of Edward VII is printed in full in the "Bulletin of the Bureau of the American Republics" for January, 1903.

Hon. John W. Foster, at the request of President Roosevelt and Secretary of State Hay, has taken charge of the presentation of the United States case in the Alaskan boundary dispute. Mr Foster will be assisted in the work by Mr Robert Lansing, who was one of the junior counsel in the Bering Sea Arbitration at Paris in 1893 and associate counsel of the United States in the Bering Sea Claims Commission of 1896. Secretary of War Root, Senator Lodge, and Senator Turner, of Washington, will represent the United States on the Commission.

"Wind Velocity and Fluctuations of Water Level on Lake Erie" is the subject of a bulletin by Prof. A. J. Henry issued by the U. S. Weather Bureau. The heavy westerly winds that sweep across Lake Erie from end to end pile the water high up in the harbor of Buffalo and leave low water in the channel at the mouth of the Detroit River at the other end of the lake. Shipping is much inconvenienced by such changes in level. Professor Henry, as a result of his study of the variations in the water level, believes that it is possible to predict extreme high water at Buffalo, so that in case of a severe seiche property-owners along the wharves could be warned in sufficient time to remove their goods. A series of diagrams show the wind velocity and water level hourly fluctuations on the lake from December 1, 1899, to November 30, 1900.

The Pittsburg Coal District.—The first of the series of new maps which are being prepared by the Geological Survey in coöperation with the State of Pennsylvania, has recently appeared as the Masontown-Uniontown Geologic Folio, No. 82. The area covered by this folio, which is named from two of the leading towns in the district, includes 458 square miles and lies mainly in Fayette County, although also including portions of Greene and Washington counties. The folio includes 8 maps, showing the hills, streams, roads, houses, mines, coals, geologic formations, and the details of geologic structure. In addition to the maps, there are 21 large-size pages of description written by Mr Marius R. Campbell, in which the geology of the region is described in detail. Many sections showing thicknesses and the character of the coals are given.

Thomas Willing Balch, of the Philadelphia bar, will shortly have ready a monograph entitled, *The Alaska Frontier.* He will give in it reproductions of 28 maps, discuss the international law bearing on the boundary question, and bring out much new evidence. Mr Balch has collected his facts in Alaska, Saint Petersburg, Berlin, Paris, London, Edinburgh, and many other places.

In the London Times for December 16 and December 27, 1902, are published two long letters from Edward Whymper, the well-known mountaineer, describing some explorations he made among the Canadian Rockies in 1901 and 1902.

The Division of Hydrology, a new division, has recently been organized in the hydrographic branch of the United States Geological Survey. The work of this division will include the gathering and filing of well records of all kinds, the study of artesian and other problems relating to underground waters, and the investigation of the stratigraphy of the water-bearing and associated rocks. In addition to the gathering of statistics relating to the flow, cost, etc., of the wells, it is hoped in the future to give especial attention to the geologic feat-

ures which govern or which are related in any way to the supply of water.

The division will be subdivided into two sections, the eastern and the western, the first embracing the Gulf and Mississippi River States and the States to the east, and the second embracing the remaining "reclamation" States and Territories, or those having public lands. The charge of each section has been assigned to a geologist, the western section to Mr N. H. Darton, and the eastern to Mr M. L. Fuller. The office details are in charge of Mr Fuller.

Dr Hugh M. Smith is the author of an illustrated report on the "Herring Fisheries of England, Scotland, and Holland," recently issued by the U. S. Fish Commission. The report is based on the observations made by Dr Smith during a visit in 1900 to the principal herring-fishing centers of the countries named. The herring is today a leading fish in the United States, Canada, Newfoundland, England, Scotland, Ireland, Holland, France, Norway, Sweden, and Russia. A species very similar to that of the Atlantic Ocean is found in the North Pacific Ocean, and is caught in large quantities in Japan and Alaska. In point of number of individual fish taken for market, no species exceeds the herring. The annual value of the herring fisheries is $25,250,000, representing 1,500,000,000 pounds of fish.

The Naval Hydrographic Office has issued a fourth edition of "The Navigation of the Gulf of Mexico and Caribbean Sea" (volume 2), embracing the coast of the mainland from Key West, Florida, to the Orinoco River, Venezuela, with the adjacent islands, cays, and banks.

One phase of the English interpretation of the Alaskan boundary is seen by following their proposed line in the map on page 90. Promontories belonging to the United States would be cut off from the mainland like islands, and have no communication with each other except through foreign land or by water. In other words, the English contention would establish a series of artificial islands along the Alaskan coast. The English interpretation contradicts the intent of all boundary lines, which are designed to follow a natural and convenient dividing line.

Dr J. L. M. Curry, a member of the National Geographic Society for many years, and distinguished as a statesman, educator, and author, died in Asheville, N. C., February 12. Dr Curry was born in Georgia 78 years ago. During the years 1857 to 1861 he was a member of Congress, and from 1861 to 1865 a member of the Confederate Congress and a lieutenant colonel in the C. S. A. From 1865 to 1881 he held chairs in Howard College and Richmond College. In 1885 President Cleveland appointed him Minister to Spain, where he represented the United States for four years. Of late years Dr Curry has been the general agent of the Peabody and Slater educational funds. He has always been closely identified with all educational movements for and in the Southern States. He was the author of several books and many articles dealing with problems of the South.

The proceedings of the Section of Geology and Geography of the American Association for the Advancement of Science, for the Washington meeting, December 26–January 3, are published in *Science* for February 6, 1903, pp. 217–229.

The article by Hon. O. P. Austin on "Problems of the Pacific—the Commerce of the Great Ocean," published in the August, 1902, number of this Magazine, has aroused much interest in the Far East. It has been translated into Japanese and published in Tokyo, and into Russian and published at Vladivostok. It is at present being rendered in Chinese, and will soon be

read in Chinese characters by the enterprising merchants of China.

Map Sheets of New York State. Among the latest which have come from the press of the Geological Survey are those of the Clayton and Grindstone quadrangles, which embrace portions of the State along the St Lawrence River in the vicinity of Clayton and the Thousand Islands, and those of the Ticonderoga and Mettawee quadrangles which cover sections of northeastern New York along the Vermont boundary. The Ticonderoga sheet shows the historic region at the northern end of Lake George and the southern end of Lake Champlain and includes the eastern foothills of the Adirondack Mountains and a portion of Addison County, Vt. The Mettawee sheet covers a part of Washington County, N. Y., and the rugged region in western Bennington and Rutland counties, Vt.

A Map of the Philippines is now on the press and will be issued during March by the Military Information Division of the War Department. The map includes the results of practically all explorations and surveys to the close of 1902. It is in four sheets, each sheet being 30 x 46 inches, and on the scale of 1:800,000. The size of the entire map is thus 5 x 7 feet 8 inches.

The American Museum of Natural History has sent Dr E. O. Hovey to the Lesser Antilles to continue his studies of the volcanic disturbances on Martinique and St Vincent. Dr Hovey plans to spend at least two months on the islands. After an examination of the present condition of La Souffrière and Mont Pelée, he will visit in turn each volcanic island in the group, taking photographs of their craters and solfataras, and making collections for the Museum.

The family of S. A. Andrée, the Arctic aeronaut, have finally admitted that their last hope of his being still alive is gone. Andrée's brother, Capt. Ernst Wilhelm Andrée, of the Swedish army, has applied to the courts to declare him dead, in order that he may obtain the small property willed him by the lost explorer.

Mr E. J. Moura, Secretary of the Geographical Society of the Pacific, announces that as the Merchants' Exchange Building will soon be torn down to give space for another structure, the Council of the Society decided to remove the library and office of the Society to other quarters. The new location is 419 California street, corner of Leidesdorff street. This is the center of the city's banking and insurance business, and convenient of access to the members, as well as to newspaper men who wish to consult charts of the U. S. Coast Survey, or desire information upon rivers, harbors, and mountain ranges. The latest maps of Alaska and the Philippines will be open to inspection. Letters and packages for the Society should be addressed to 419 California street, San Francisco, Cal.

Commander J. F. Moser, U. S. N., is the author of a report on "The Salmon and Salmon Fisheries of Alaska," the result of exhaustive investigations by the Fish Commission in 1900 and 1901. Many illustrations and maps of streams and bays accompany the text, making an exceedingly handsome and useful publication.

A. B. Alexander is the author of an illustrated bulletin issued by the U. S. Fish Commission describing the boats and fishing methods of the natives of the South Sea Islands. The bulletin contains much that is interesting about the inhabitants of these South Pacific islands.

Commander Robert E. Peary has been elected President of the American Geographical Society of New York, succeeding the Hon. Seth Low who resigned several months ago.

GEOGRAPHIC LITERATURE

Handbook of Birds of the Western United States. By Florence Merriam Bailey. With 33 full-page plates by Louis Agassiz Fuertes, and over 600 illustrations. Pp. xc + 512. 8 x 5½ inches. Boston: Houghton, Mifflin & Co. 1902. $3.50 *net.*

Only minute study and infinite patience, added to a personal acquaintance with nature and with practically every bird described, big or little, could make this book possible. The volume cannot be too strongly commended. The person who knows nothing about birds is fascinated by the simple living descriptions, while the specialist gains a fund of information from the careful and systematic classification.

The introduction of over 90 pages includes articles on "Collecting and Preparing Birds' Nests and Eggs," by Vernon Bailey; "Bird Protection," by T. S. Palmer, local lists of birds found in different sections of the West, and a handily arranged bibliography, followed by a key to families of water birds.

The biography of each bird opens with a brief description of the principal characteristics of the bird, its plumage, size, distribution, where it builds its nest, and the color of its eggs. This is followed in every case by an account of the bird's habits and life. Mrs Vernon Bailey has a delightful style and gives a personal interest to the subjects. The following random selection is cited as an example:

"In the stillness of the high mountain forests your ear sometimes catches the thin, finely drawn pipe of the brown creeper, and if you watch patiently on the dark-shaded boles of the lofty trees you may discover the little dark-colored creature—seeming small and weak in the great solemn fir forest—creeping up the trunks, examining the cracks with microscopic care as he goes. If he feels that his work has not been done thoroughly enough he drops back and does it over again; and when one tree has been gone over to his satisfaction, he often flies obliquely down to the bottom of another trunk and creeps patiently up that. On Mount Shasta, where the firs are decorated with yellow moss, the Sierra creeper goes around its pads when he comes to them, but works carefully over the dark lichen-covered branches. Sometimes he lights upside down on the under side of a branch, and clings like a fly, but with the aid of his pointed tail well pressed against the bark."

Mr Vernon Bailey is the author of a number of the biographies, and others who helped Mrs Bailey to make the book a success are Dr C. Hart Merriam, Mr R. Ridgway, Dr A. K. Fisher, Mr E. W. Nelson, and Dr T. S. Palmer.

The Tragedy of Pelée. By George Kennan. Illustrated. Pp. 257. 5½ x 8 inches. New York. The Outlook Co. 1902 $1.50 *net.*

Mr Kennan went to Martinique on the *Dixie* as the special representative of *The Outlook*. This volume includes his letters to that journal revised and much enlarged.

For vivid description some of the chapters in the volume are surpassed by few things in literature. In chapter IV, "In the Track of the Volcanic Hurricane," an account is given of a long interview with Ciparis, the negro criminal who imprisoned in an underground dungeon escaped the deadly blast of May 8, and whom Mr Kennan had the enterprise to hunt up and personally interview. The testimony of this man is of great importance in explaining the causes of death on May 8. Ciparis was waiting for his breakfast, when suddenly it grew very dark, and also immediately after hot air mixed with fine ashes came in through the grating

and burned him. He heard no noise, saw no fire, smelled nothing "except what he thought was his own body burning." There was no smoke, and the hot air came in through the grating without any appreciable rush or blast. His clothing did not take fire, and yet his back was very severely burned under his shirt.

An interesting phenomenon noted by Mr Kennan was the stellar lightning which characterized the night eruptions. Several illustrations of this are given.

The chapter on "Causes of the Catastrophe" is worthy of a professional geologist, something that Mr Kennan does not profess to be. His belief is "that the volcanic discharge which destroyed St Pierre came from a lateral fissure near the summit of the mountain; that it did not contain any considerable amount of gas; that it did not burst into flame, and that it did not cause death by asphyxiation." The death-dealing blast, according to Mr Kennan, was composed of superheated steam charged with fine dust. The weight of the dust carried by the steam depressed the blast so that it followed the slope of the mountain. The dust was hot enough to set fire to inflammable objects inside the houses, which did not catch fire from the outside, but from the inside.

The volume is graphically illustrated from drawings by George Varian and from photographs by the author.

The American Cotton Industry. By T. M. Young. Pp. 146. 5 x 7½ inches. London: Methuen & Co. New York: Imported by Charles Scribner's Sons. 1902. 75c. *net.*

The author in the spring and early summer of 1902 visited the cotton-manufacturing districts in New England and in the Southern States. He had been sent from England by the cotton manufacturers of Manchester, who desired a careful investigation and comparison of the cotton spinning and weaving industry in England and the United States. It has been generally known for some years that the American cotton factories were outstripping those in England. Mr Young, as a result of his study, does not think the American weaver is more intelligent or better paid than the British weaver, but that our advantage is (1) because American management is more economical of labor—that is, we do not divert a skilled man's attention and time to the small things which an unskilled man can do just as well, and (2) because the American manager is alert for the newest invention, and adopts even inventions made in England before the English manager considers them.

Year-book of the Department of Agriculture, 1901. Edited by Geo. Wm. Hill. With plates and maps. Pp. 846, 6½ x 9½ inches. Washington: Government Printing Office, 1902.

The Year-book for 1901 teems with important geographic material. The report of the Secretary takes 115 pages, and is followed by 33 articles on special topics, of which the following may be mentioned:

"The Purpose of a Soil Survey." Milton Whitney.

"Insects as Carriers and Spreaders of Disease." L. O. Howard.

"The Future Demand for American Cotton." J. L. Watkins.

"The Timber Resources of Alaska." Wm. L. Hall.

"Progress in Plant and Animal Breeding." Willet M. Hayes.

"Agricultural Seeds—Where Grown, How Handled." A. J. Pieters.

"The Prairie Dog of the Great Plains." C. Hart Merriam.

"Grazing in the Forest Reserves." Filibert Roth.

"Agriculture in the Tropical Islands of the United States." O. F. Cook.

"Little-Known Fruit Varieties Considered Worthy of Wider Dissemination." Wm. A. Taylor.

"Two Vanishing Game Birds—The Woodcock and the Wood Duck." A. K. Fisher.

"Experimental Work with Fungous Diseases of Grasshoppers." L. O. Howard.

"The Hemp Industry in the United States." Lyster H. Dewey.

"Wheat Ports of the Pacific Coast." Edwin S. Holmes, Jr.

Many handsome full-page plates and maps illustrate the text.

BOOKS RECEIVED

THE following new books have been received and will be reviewed in due course:

"Mont Pelée and the Tragedy of Martinique." By Angelo Heilprin. With many illustrations. Pp. XIII+337, 6½ by 9½ inches. Philadelphia: J. B. Lippincott Co. 1903. $3.50 net.

"Birds of the Rockies." By Leander S. Keyser. With illustrations by Louis Agassiz Fuertes and Bruce Horsfall. Pp. 355, 6½ by 9 inches. Chicago: McClurg & Co. 1902. $3.00 net.

"The Conquest." The true story of Lewis and Clarke. By Eva E. Dye. Pp. 443, 5½ by 8 inches. Chicago: McClurg & Co. 1902. $1.50.

"United States Magnetic Declination Tables and Isogonic Charts for 1902, and Principal Facts Relating to Earth's Magnetism." By L. A. Bauer. With maps and illustrations. Pp. 405, 8 by 11½ inches. Washington: U. S. Coast and Geodetic Survey. 1902.

"Mountaineering in the Sierra Nevada." By Clarence King. Pp. 378, 5½ by 7¾ inches. New York: Charles Scribner's Sons. 1902. $1.50. New edition.

"Japanese Girls and Women." By Alice Mabel Bacon. Pp. 337, 5½ by 8¼ inches. With illustrations. Boston: Houghton, Miflin & Co. 1902. Revised and enlarged edition.

"The Question of the Pacific." Translated and enlarged from Dr Victor M. Maurtua, by F. A. Pezet, Secretary to the Legation of Peru at Washington. With map. Pp. 312, 6½ by 9½ inches. Philadelphia: George F. Lasher. 1901.

"Some By-Ways of California." By Charles F. Carter. Pp. 189, 5½ by 7½ inches. New York: The Grafton Press. 1902.

"Complete Geography." By Ralph S. Tarr and Frank M. McMurry. With many maps and illustrations. Pp. XI+478+X, 6½ by 8½ inches. New York: The Macmillan Co. 1902.

"The Physical Geography of New York State." By Ralph S. Tarr. With many maps and diagrams. Pp. 397, 6½ by 9 inches. New York: The Macmillan Co. 1902. $3.50 net.

"Asiatic Russia." By George Frederick Wright. With many maps and illustrations. 2 vols: XIII+290, XII+291–637. New York: McClure, Phillips & Co. 1902. $7.50.

"The Travels of Pedro Teixeira, with his 'Kings of Harmuz' and extracts from his 'Kings of Persia.'" Translated and annotated by William F. Sinclair, with further notes and an introduction by Donald Ferguson. Pp. C+292, 6 by 9 inches. London: Printed for the Hakluyt Society (series II, vol. 9). 1902.

"Report of Alfred C. Lane, State Geologist of Michigan, for 1901." With many maps. Pp. 304, 6 by 9 inches. Published by the State. Lansing, 1902.

"Antarctica." By Edwin Swift Balch. With maps. Pp. 230, 7 by 10 inches. Philadelphia: Allen, Lane & Scott. 1902.

"American Diplomacy in the Orient." By John W. Foster. Pp. XIV+498, 6 by 9 inches. Boston: Houghton, Mifflin & Co. 1903. $3.00 net.

"Unknown Mexico." By Carl Lumholtz. 2 vols. Pp. 1,600. With over 530 illustrations and maps, 6½ by 9½ inches. New York: Charles Scribner's Sons. 1902. $12.00 net.

"The Great Mountains and Forests

of South America." By Paul Fountain. With illustrations. Pp. 306, 6 by 9 inches. New York: Longmans, Green & Co. 1902. $3.00.

"Economics of Forestry." By Bernhard E. Fernow. Pp. 520, 5½ by 8 inches. New York: Thomas Y. Crowell & Co. 1902. $1.50 net.

"A Tour in Mexico." By Mrs James Edwin Morris. With illustrations. Pp. 322, 5½ by 8 inches. New York, London, Montreal: The Abbey Press. 1902.

"The Elements of General Method." By Charles A. McMurry, Ph. D. Pp. 331, 5 by 7½ inches. New York: The Macmillan Co. $0.90.

"Lakes of Southeastern Wisconsin." From Wisconsin Geological and Natural History Survey. By N. M. Fenneman, Ph. D. With illustrations. Pp. 178, 6 by 9 inches. Published by the State. Madison, 1902.

"Red-men's Roads." By Archer Butler Hulbert. With illustrations. Pp. 37, 6 by 9 inches. Columbus, Ohio: Fred J. Heer & Co. 1900.

"Commercial Geography." By Walter H. Olin, Superintendent City Schools of Ottawa, Kansas. With many illustrations. Pp. 260, 8 by 10 inches. Topeka: Crane & Co. 1902.

"Highways and Byways in London." By Mrs E. T. Cook. With illustrations by Hugh Thomson and F. L. Griggs. Pp. 472, 5½ by 8 inches. New York: The Macmillan Co. 1902.

"The Egregious English." By Angus McNeill. Pp. 210, 5½ by 8 inches. New York: G. P. Putnam's Sons. 1903.

"The Discoveries of the Norsemen in America, with Special Relation to Their Early Cartographical Representation." By Joseph Fischer, S. J. Translated from the German by Basil H. Soulsby, B. A. With illustrations. Pp. 140, 7 by 10 inches. St Louis, Mo.: B. Herder. 1903.

Japanese Oyster Culture, by Bashford Dean, Assistant professor in Zoölogy in Columbia University, and published by the Fish Commission, contains the results of a study of the Japanese oyster by the author in 1900–1901. In artificial oyster culture Professor Dean concludes the Japanese are considerably ahead of the United States, but behind France and Holland. Whether the Japanese oyster can be cultivated successfully along our Pacific coast may only be answered by experiment.

RECENT PUBLICATIONS BY THE U. S. GEOLOGICAL SURVEY.

"A GAZETTEER of Texas." Henry Gannett. Pp. 164. With colored charts showing mean annual temperature, wooded areas, density of population, etc., and a large map of the state, prepared under the direction of Robert T. Hill.

"A Gazetteer of Cuba." Henry Gannett. Pp. 112. With colored charts and a map.

"Fossil Flora of the John Day Basin." Frank Hall Knowlton. Pp 154. With many illustrations.

"The Berea Grit Oil Sand in the Cadiz Quadrangle, Ohio." W. T. Griswold. Pp. 42. With illustrations.

"Tests for Gold and Silver in Shales from Western Kansas." Waldemar Lindgren. Pp. 19.

"Results of Primary Triangulation and Primary Traverse, fiscal year 1901–02." H. M. Wilson, J. H. Renshawe, E. M. Douglas and R. U. Goode. Pp. 164. With illustrations.

"Reconnaissance of the Borax Deposits of Death Valley and Mohave Desert." Marius R. Campbell. Pp. 22. With illustration.

"Geology and Water Resources of the Snake River Plains of Idaho." Israel C. Russell. Pp. 192. With many illustrations.

"Bibliography and Index of North American Geology, Paleontology, Petrology and Mineralogy, for the year 1901." Fred Boughton Weeks. Pp. 144.

"Structural Details of the Green

Mountain Region, and in Eastern New York." T. Nelson Dale. Pp. 22. With illustrations.

"North American Geologic Formation Names, Bibliography, Synonymy, and Distribution." Fred Boughton Weeks. Pp. 448.

Appalachian Forest Reserve. One of the most handsome of recent government publications is the large quarto volume containing the "Message from the President of the United States transmitting a Report of the Secretary of Agriculture in Relation to the Forests, Rivers, and Mountains of the Southern Appalachian Region," issued by the Government Printing Office (1902). The report is an overwhelming array of facts showing the imperative necessity of making a great forest reservation of the Southern Appalachian region.

NATIONAL GEOGRAPHIC SOCIETY

Lack of space makes it necessary to postpone publication of the proceedings of the Society until next month.

REGULAR MEETINGS.

March 13.—"The Work of the Geological Survey." Hon. Charles D. Walcott. Cosmos Club, 8 p. m.

March 27.—"The Work of the Library of Congress." Hon. Herbert Putnam. Cosmos Club, 8 p. m.

This is the last meeting of the season.

POPULAR LECTURES.

March 4.—"The United States—Mines and Mining." Mr Charles Kirchoff, editor of *The Iron Age*. Illustrated. Columbia Theater, 4.20 p. m.

March 6.—"The Geographic Distribution of Insanity in the United States." Dr W. A. White, Director of the Binghamton State Hospital, New York. National Rifles' Armory, 8 p. m.

March 11.—"The United States—The Men who Make the Nation." Vice-President W J McGee, LL. D. Columbia Theater, 4.20 p. m.

March 20.—(The last lecture of the season.) "Captain John Smith and Old Virginia." Mr W. W. Ellsworth, of the Century Company. Illustrated. National Rifles' Armory, 8 p. m.

BY-LAWS OF THE NATIONAL GEOGRAPHIC SOCIETY.

ADOPTED MAY 16, 1902.

ARTICLE I.—*Name.*

The name of this Society is *The National Geographic Society.*

ARTICLE II.—*Object.*

The object of the Society is the increase and diffusion of geographic knowledge.

ARTICLE III.—*Membership.*

SECTION 1. The Society shall consist of members, honorary members, fellows, and patrons.

SEC. 2. Members shall be persons interested in geographic science.

SEC. 3. Honorary members shall be persons who have attained eminence by the promotion of geographic science. They shall not be members of the corporation, nor shall they vote or hold office.

SEC. 4. Fellows shall be persons engaged in scientific work pertaining to geography. They shall be members of the corporation.

SEC. 5. Patrons shall be persons interested in geography who have contributed one thousand dollars or more to the objects of the Society; they shall be entitled to all the privileges of membership for life.

SEC. 6. The election of members, honorary members, fellows, and patrons shall be entrusted to the Board of Managers.

ARTICLE IV.—*Officers.*

SECTION 1. The administration of the Society shall be entrusted to a Board of Managers composed of twenty-four members or fellows, eight of whom shall be elected by the Society at each annual meeting, to serve for three years, or until their successors are elected. Of the eight members or fellows elected at each annual meeting, not less than four nor more than six shall be residents of the District of Columbia. A majority of the votes cast shall be necessary for election.

SEC. 2. The Board of Managers shall elect

annually from their own number a President and a Vice-President, and shall elect annually a Treasurer and a Secretary.

SEC. 3. The President shall preside at the meetings of the Society and of the Board of Managers, or may delegate this duty. The President and the Secretary shall sign all written contracts and obligations of the Society.

SEC. 4. In the absence of the President his duties shall devolve on the Vice-President.

SEC. 5 The Treasurer shall have charge of the funds of the Society, under the direction of the Board of Managers, and shall make collections and disbursements and render an annual report, and his accounts shall be audited by a committee of the Society, not members of the Board, annually and at such other times as the Board may direct.

SEC. 6. The Secretary shall record the proceedings of the Society and of the Board of Managers, conduct correspondence, and make an annual report.

SEC. 7. The Board of Managers shall fill vacancies arising in the Board.

SEC. 8. All officers shall serve until their successors are chosen.

ARTICLE V.—*Committees.*

SECTION 1. The Board of Managers shall select annually from its own number an Executive Committee.

SEC. 2. There shall be standing committees on Publications, Communications, Admissions, Research, and Finance, whose chairmen shall be members of the Board of Managers. These committees shall be appointed immediately after the annual election of the President, to serve until their successors are designated.

SEC. 3. The committees of the Society and of the Board of Managers shall be appointed by the President except when otherwise provided. The President shall be a member *ex officio* of every committee.

ARTICLE VI.—*Finances.*

SECTION 1. The fiscal year of the Society shall begin on the first day of January.

SEC. 2. The annual dues of members shall be two dollars, payable in January.

SEC. 3. Fellows shall pay an initiation fee of ten dollars on notice of election.

SEC. 4. Members or fellows may commute annual dues and acquire life membership by the payment at one time of fifty dollars.

SEC. 5. Members or fellows whose dues remain unpaid on March 1 shall be notified by the Treasurer that unless the dues are paid within one month they will be in arrears and not entitled to vote at the annual meeting, to receive the publications of the Society, or to purchase lecture tickets on members' terms. Members or fellows one year in arrears shall, after formal notification, be regarded as having withdrawn from the Society.

SEC. 6. The funds of the Society may be invested and loans may be negotiated in the interests of the Society, and any other financial business germane to the purposes of the Society may be transacted, by the Board of Managers.

ARTICLE VII.—*Meetings.*

SECTION 1. Regular meetings of the Society shall be held on alternate Fridays from November until May.

SEC. 2. Special meetings may be ordered by the Board of Managers or called by the President.

SEC. 3. The annual meeting shall be held in the District of Columbia on the second Friday in January.

SEC. 4. Twenty members or fellows shall constitute a quorum.

SEC. 5 Regular meetings of the Board of Managers shall be held on the same days as the regular meetings of the Society; special meetings may be held at the call of the President or on notice signed by five members of the Board: *Provided*, That for any of its own meetings the Board may substitute meetings of the Executive Committee.

SEC. 6. Lectures and lecture courses may be provided by the Board of Managers. Free admission to such lectures shall not be a prerogative of membership, but tickets shall be sold to members and fellows on more favorable terms than to non-members: *Provided*, That each life member who acquired life membership prior to the year 1901 shall be entitled to two admissions to each lecture and course.

ARTICLE VIII.—*Publications.*

The Society shall publish a journal or periodical under the title, *The National Geographic Magazine*, which shall be sent to all members and fellows of the Society not in arrears, and may be placed on sale.

ARTICLE IX.—*Amendments.*

These By-Laws may be amended by a two-thirds vote of the members present at any regular meeting, provided the proposed amendments are reported by the Board of Managers, and provided that notice thereof has been sent to all members of the Society not less than ten nor more than sixty days before the meeting. The publication of proposed amendments in The National Geographic Magazine shall be deemed a notice within the meaning of this article.

The Popular Science Monthly

Entered in the Post Office at Lancaster, Pa., as second-class matter

Contents of January Number

The Missouri Botanical Garden. Professor William Trelease.

The Saving of Vanishing Data. Alfred C. Haddon.

America's Distrust of the Immigrant. A. J. McDaughlin.

Variation in Man and Woman. Havelock Ellis.

The Engineering Mind. J. C. Sutherland.

Postgraduate Degrees in Absentia. Dr. A. L. Benedict.

Mental and Moral Heredity in Royalty. Dr. Frederick Adams Woods.

Mendel's Law. W. J. Spillman.

The Progress of Science:

The Convocation of Scientific Societies; The Carnegie Institution; The British Education Bill; Ogden N. Rood; The Proposed Enlargement of the Naples Station; The New York Aquarium; Are Solutions Mechanical Mixtures or New Substances; Scientific Items.

Contents of February Number

Dr. Carroll D. Wright.

The Science of Astronomy. Professor Adam Hall.

The Evolution of Sex in Plants. Professor Bradley M. Davis.

The Economic Importance of Forestry. Gunnison W. Price.

Mental and Moral Heredity in Royalty. Dr. Frederick Adams Woods.

The Smithsonian Institution.

Recent Jewish Immigration to the United States. Roger Mitchell.

The Behavior of Blind Animals. Professor Wesley Mills.

Preventive Medicine. General George M. Sternberg.

A Statistical Study of Eminent Men. Professor J. McKeen Cattell.

Scientific Literature:

Biographies of Eminent Chemists.

The Progress of Science:

The American Association for the Advancement of Science; The Recognition of the Importance of Preventive Medicine; A Newly Recognized Factor in American Anemias; "The Germ of Laziness"; Carnegie Institution of Washington; Scientific Items.

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